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Reading Room

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CHARGE A FAIR PROFESSIONAL FEE

A NEW THERAPEUTIC APPROACH TO RETAINED PLACENTA

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GENERAL PRACTICE TOPICS

SPECIAL INFERTILITY SECTION

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Generalized Genital Infection in the Bull

John B. Herrick, D.V.M.
Iowa State University

Inflammation in the genital tract of bulls is not uncommon but rarely does it involve the entire genital tract. It is thought that injuries and anatomical defects usually account for the abnormalities observed in the genital tract of a bull. Frequently infections are encountered involving the prepuce and occasionally orchitis is observed as a result of Brucella infection.

Infections of the reproductive tract in cattle are becoming more common as a result of bacterial infections with organisms such as *Corynebacterium pyogenes* and streptococci or other so-called opportunists. A history of repeat services, abnormal discharge after calving and endometritis or metritis are the usual symptoms within an infected herd. These same infections may involve a bull, as evidenced by the 12-month-old bull shown in the accompanying photograph. This bull had not been used for service, yet was observed to have a unilateral orchitis. A mild swelling with a great deal of inflammation was observed in the right testicle. Rectal examination revealed a seminal vesiculitis with the enlarged glands filling the entire pelvic cavity. The spermatic cord was also greatly enlarged and very painful to the touch.

Gentle massage of the seminal vesicles produced a discharge from the sheath, and when this was cultured it consisted primarily of *Corynebacterium pyogenes*. Approximately 10 days later a swelling was observed in the umbilical area which ruptured. This was cultured and identified bacteriologically as *Corynebacterium progenes*.

The bull responded to symptomatic treatment with antibiotics and no clinical abnormalities could be observed 3 weeks after initial infection. However, bacteriological examination of the semen yielded *Corynebacterium pyogenes* for a period of 7 months following the initial infection. Consequently the bull was destroyed because of the danger of spreading this infection as a breeder.

Clinically this emphasizes the importance of a rectal examination when an orchitis is observed. Frequently these infections are accompanied by a seminal vesiculitis and many different organisms are involved. The exact manner in which these organisms gain entrance and produce an inflammatory process in the reproductive tract is not definitely known. However, the clinician has the responsibility of thoroughly checking any animal showing evidence of an orchitis to prevent the spread of this infection to females used for breeding.

Examination of Uteri from Artificially and Naturally Bred Cows

D. M. Trotter, D.V.M., M.S.
Kansas State University

In the preliminary report of this study[1] only a limited number of infertile cows had been sent to slaughter so an investigation of their genitalia could be made. Since that time a total of 42 cows in herd No. 1, (the artificially bred herd) and 32 cows in herd No. 2 (the naturally bred herd) or a total of 74 cows with a history of difficult breeding or infertility have been available for observation.

The purpose of this study was twofold: first, to try to correlate pathological findings with bacteriological findings and then to infertility itself; second, to find if there might be any correlation between the pathological picture, the bacteriology and the infertility with programs of natural and artificial breeding.

Two separate herds of Hereford cows furnished the animals for this study.

Herd No. 1 had been in a private artificial insemination program for over 5 years and furnished 42 animals for this study. The animals were raised under ideal conditions for the area of the country. This herd was closely observed at all times by a veterinarian and none of the animals sent to slaughter for reasons of infertility was showing any clinical sign of ill health or endocrine disturbance.

Herd No. 2 was in a program of natural breeding and furnished 32 animals for this study. This herd was also raised under ideal conditions and was under close observation by a veterinarian. All animals sent to slaughter from this herd were apparently healthy but had been sterility problems in this program of natural breeding.

A total of 74 cows from the above 2 herds was sent to slaughter and thus became available for this study. The same technics of study were used for both herds. At the slaughter house the vaginal canal was tied securely by a cord before the genitalia were removed. The ovaries, uterus and vagina of each animal were removed intact, tagged for identification and placed in iced containers for transport to the laboratory. At the laboratory, material for bacteriological examination was secured from each uterus, using bacteriological procedures as described in the preliminary report.[1] A gross examination of the genitalia was made to note presence or absence of lesions of the ovaries. The external surfaces of the uterus, cervix and vagina were examined for size, muscle tone, and presence or absence of lesions. The genital tract was opened and internal surfaces of the organs were examined. Oviducts were checked for

lesions and patency. Tissue specimens for sectioning were secured from the uterus in all cases and from other areas if lesions existed. Care was taken to include portions of the endometrium which would represent both the cotyledonary and the intercotyledonary portions in the material for sectioning. The sections from these specimens were made in 2 series, one series stained with hematoxylin and eosin, and the other series by the Mallory aniline blue collogen stain.

Observations

No attempt will be made in this paper to describe in detail the lesions or changes observed in the individual specimens. The object of the study was to try to correlate changes within the genital organs with the bacteriology, the program of breeding being used and with the clinical history of infertility or breeding difficulties.

As indicated in the preliminary report, there has been little correlation between the bacteriology and the presence or absence of lesions (Table 1). There was a greater tendency toward infection or bacterial invasion and the presence of microscopic (45.2%) and gross (45.9%) lesions in the artificially bred herd than in the naturally bred herd, which showed 21.8% and 18.7% respectively for the same conditions. On the other hand, the naturally bred herd had more gross (28.1%) and microscopic (28.1%) lesions in the sterile uteri than the artificially bred herd, in which the percentages were 11.9 and 14.0 respectively.

There were pregnant animals in both groups. These cows had histories of infertility or difficult breeding. They were allowed to remain in the study to determine if there might be any lesions or bacteriology of significance. Five (including one mummified fetus) of the 7 gravid uteri were sterile bacteriologically. Only one of the gravid uteri exhibited lesions similar to the lesions found in some of the nongravid uteri.

A variety of lesions were noted in the organs examined. In most cases at least one ovary seemed to be functioning. Some ovaries were in a nonfunctioning state and showed no developing follicles or corpora lutea. Other ovaries and their accompanying oviducts were partially or completely embedded in fibrous connective tissue. These adhesions usually involved only one ovary on a specimen. Some of the uteri were atonic in one or both horns. Internally, the

TABLE 1
Summary of Pathological Observations

	Artifically Bred Herd (No. 1)	Naturally Bred Herd (No. 2)	Total	Percent of Total	Percent of Herd No. 1	Percent of Herd No. 2
Number of Cows	42	32	74	.....	.....	.....
Normal Pregnant	6	1	7	9.45	14.0	3.1
Gross Pathology Noted	19	15	34	45.9	45.2	46.6
Microscopic Pathology Noted	24	16	40	54.0	57.1	50.0
No Microorganisms Isolated	13	16	29	39.1	30.7	50.0
Isolated Microorganisms	29	16	45	60.9	69.3	50.0
Gross Pathology						
Sterile	5	9	14	18.9	11.9	28.1
Isolated organisms	14	6	20	27.0	45.9	18.7
Microscopic Pathology						
Sterile	6	9	15	22.8	14.0	28.1
Isolated Organisms	18	7	25	33.7	45.2	21.8
No Gross Pathology						
Sterile	8	7	15	22.8	19.0	21.8
Isolated Organisms	10	9	19	25.6	23.8	28.1
No Microscopic Pathology						
Sterile	7	7	14	18.9	16.6	22.4
Isolated Organisms	10	9	19	25.6	23.8	28.1

uteri occasionally exhibited small areas of congestion, with occasional petechial hemorrhages in the endometrium. In some the endometrial epithelium was sloughing or eroding. Varying amounts of exudate of a serous, catarrhal, sero-hemorrhagic, gelatinous or purulent nature were found in some uteri. Several uteri showed lesions around the *os uterinum tubae* of the oviduct.

Many different organisms were found in various combinations on culture of material from the uteri. These organisms in the order of their incidence were as follows: *Staphylococcus pyogenes (albus), Pseudomonas jaegeri, Sarcina lutea, Streptococcus acidominimus, Bacillus subtilis, Bacillus cereus, Gaffkya tetrogina, Staphylococcus pyogenes (aureus), Escherichia coli, Bacillus megatherium, Micrococcus aurontiacus, Actinomyces albus, Blastomyces, Bacillus brevis, Bacillus mycoides,* mold (penicillium) and *Pseudomonas aeruginosa.* There were few pure cultures and the various combinations of organisms isolated were inconsistent. The artificially bred herd showed infection with some of the above organisms in 69.3% and the naturally bred herd in 50% of the uteri studied.

Because most cows had some ovarian function at least in one ovary it was difficult to determine whether some of the microscopic picture was part of the normal reproductive cycle or was of a pathological nature. The congestion, edema, leukocytic and glandular activity and condition of the epithelium often were similar in uteri from which bacteria were obtained to those in which no bacteria were found. Thus the infections may have been of such a low grade that there was actually little discernible reaction to the bacteria on the part of the endometrium.

Adhesions embedding some ovaries could have contributed to the infertility problem, but it is more likely the problem existed first and that adhesions were due to rectal examination of the ovary during clinical examination of the cow.

Although the nutritional state of these animals was considered to be good and no obvious endocrine imbalance was noted clinically, these factors could have been insidiously contributing to the problem. The relationship of these factors to infertility, to resistance to infection and to physiological changes in the genitalia was not within the scope of this study, but it must be considered in any interpretation of results.

In uteri in which excess or abnormal exudates were present, infertility could be related to the exudates or to organisms responsible for the formation of the exudates.

Summary

A total of 74 uteri from Hereford cows that were infertility problems was collected at slaughter. These animals were from two herds, 42 from a herd on an artificial insemination program and 32 from a naturally bred herd.

Bacteriological and pathological examinations were made of the uteri. In most cases the pathology was so mild it was difficult to differentiate from congestion, edema and cellular infiltration that occur in the normal cyclic changes of the reproductive tract. There was a tendency of more bacterial infection and more gross and microscopic lesions in the artifically bred herd than in the naturally bred herd. There appeared to be little correlation between gross and microscopic pathology and bacteriology.

Very few cultures of organisms were isolated and the various combinations were inconsistent. Bacteria were isolated from 69.3% of the uteri from the artificially bred herd and from 50.0% of the naturally bred herd.

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Virological Examination of Bovine Uteri

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Infertility is one of the major economic problems of the dairy industry. A major concern in infertility problems is the apparently normal cow that fails to conceive after repeated servicing. Surveys on such repeat breeder cows conducted by Tanabe and Casida,[1] Tanabe and Almquist,[2] and Hawk *et al.*[3] showed early embryonic deaths of 65.1%, 54.1%, and 51.7%, respectively.

Studies of bacterial uterine infections as a cause of low fertility have given varying and inconsistent results.[4-8] Many different organisms were isolated from low fertility cows. The predominant organisms isolated were members of the genera *Micrococcus, Streptococcus, Corynebacterium* and *Neisseria.* Kiesel and Dacres[9] isolated many of these same organisms but considered them only transient opportunists with no real significance in lowered fertility.

Viral infertility in cattle was reported by Millar[10] as associated with a vaginitis, edematous endometritis and embryonic mortality. He cultured the filterable agent in the yolk sac and on the chorioallantoic membrane of embryonated hen's eggs and then reproduced the condition with third passage egg material by intravaginal, but not by intravenous inoculation. He postulated that he was working with two infectious agents, one causing vaginitis and one, an endometritis.

Uterine samples for culture were obtained from 47 cows: 39 from the Kansas State University dairy herd and 8 from the Armour Packing Company, Kansas City, Mo. Complete breeding histories were available on 35 of the university cows and limited breeding histories on the remaining four. Histories were not available on the cows obtained from the slaughterhouse.

Samples for virological cultures were obtained from the cows at time of slaughter. When the carcass was eviscerated the uterus was excised, one horn ligated and removed. Ten ml. of sterile peptone buffered water was injected into the lumen and withdrawn. The uterine horn and uterine washings were transferred at 0° C. to the laboratory where the uterus was opened aseptically and a portion of the mucosa was removed and ground into a paste with sand in a sterile mortar. The tissue was suspended in peptone buffered water and the uterine washings and tissue were pooled to be used as inoculum. Samples were diluted 1:10 in phosphate buffered saline containing 250 units of penicillin and 100 units of streptomycin per ml. to control bacterial contamination.

The 39 samples collected from the University animals had the following histories. Fifteen uterine samples were from cows that were bred two or more times without conceiving and were not pregnant at the time of slaughter (Table 1). Seventeen samples were taken from cows with

Contribution No. 382, Department of Bacteriology and Contribution No. 188, Department of Veterinary Medicine, Kansas Agricultural Experiment Station, Manhattan, supported by National Institute of Health. This investigation was done as a part of a research project concerned with causes of bovine embryo loss. Portion of a thesis submitted as partial fulfillment of the requirements for the Master's degree in Pathology at Kansas State University, Manhattan.

histories of two or more services before conception and pregnant at time of slaughter (Table 2). One sample (No. 466) was from a cow that had aborted 17 days previously at 46 days of gestation and numbers 406, 423, and 464 were from cows that were 2 months post-partum. Samples 413, 447, and 470 were from normal breeding cows that conceived on the first service and in which a normal pregnancy existed at time of slaughter.

Of the samples collected at the Armour Packing Company, numbers 403, 408-410, 414, and 416 were from cows with dead and resorbing embryos or membranes present in their uteri and 421 and 422 were an estimated 40 and 50 days post-partum.

TABLE 1

Repeat Breeder Cows Not Pregnant at Slaughter

Sample No.	No. of Previous Calves	Heat Cycle Since Last Parturition	Services Since Last Parturition	Days Since Last Service
405	2	3	3	3
407	2	6	4	42
411	0	2	2	6
412	5	7	7	32
424	2	1	1	120
445	6	5	4	12
456	0	16	14	136
459	1	7	6	55
460	1	10	8	29
462	3	7	6	37
463	5	5	4	22
467	1	3	2	6
468	1	4	3	39
469	0	12	11	10
482	2	7	6	87

Embryonated hen's eggs were inoculated with 0.2 ml. of the uterine sample by each of 3 routes: the yolk sac, the allantoic cavity, and the chorioallantoic membrane. Five- to 6-day-old embryonated eggs were used for yolk sac inoculations and 10- to 11-day-old embryonated eggs for allantoic cavity and chorioallantoic membrane inoculations.

Stationary tube cultures of trypsinized bovine kidney cells were prepared by the methods described by Dulbecco and Vogt and by Madin *et al.* Renal cortices of kidneys collected from 3-week- to 3-month-old healthy calves were used in preparing the cell cultures. Growth medium consisted of 85% Eagle's minimum essential medium (MEM) and 15% calf serum; maintenance medium for inoculated cultures consisted of 99% MEM and 1% horse serum. Primary and secondary cultures were used in this study. However, no secondary culture was used beyond the 4th transfer. Tube cultures were inoculated with 0.1 ml. of the uterine sample.

Results

All samples were passed in the yolk sac, allantoic cavity, and on the chorioallantoic membrane for 3 serial passages. Each passage was incubated 7 to 9 days. Samples 459 to 463, 466 to 469, 471, and 42 were serially passed in the allantoic cavity and on the chorioallantoic membrane an additional 4 passages. Yolk sac smears from each passage were stained with Giemsa's stain and examined for the presence of intracellular inclusions. No evidence of viral infection was detected in any of the 47 uterine samples cultured in embryonated eggs.

Samples 401 to 485 were inoculated into bovine kidney cell cultures and incubated for 3 weeks. They were examined daily for degeneration or cytopathogenic effects. At the end of the 3-week period the monolayers were fixed with 10% formalin and

TABLE 2

Cows With Repeat Breeding Histories But Pregnant at Slaughter

Sample No.	No. of Previous Calves	Heat Cycle Since Last Parturition	Services Since Last Parturition	Days Pregnant
401	1	4	3	25
402	1	4	4	150
404	2	7	4	256
443	5	17	10	51
444	2	2	2	68
446	2	4	4	117
448	2	5	5	56
461	0	11	10	19
465	3	4	3	111
471	1	5	4	35
481	0	7	7	64
483	1	3	2	151
484	1	8	6	177
485	1	6	4	168
491	1	3	3	60
492	1	3	3	48
493	2	3	3	189

stained with Giemsa's stain to observe possible nuclear degeneration. Samples 459 to 463, 466 to 469, 471, 482, and 491 to 493 were serially passed in bovine kidney cell cultures for 4 passages with a 7-day incubation period for each passage. Cells were examined daily for cytopathogenic effects but none was detected in any of the samples by either of the methods employed.

Even though viral agents were not demonstrated in this survey, it is possible that viruses could play an important role in the etiology of early embryonic deaths. The problem should be approached from many angles before viruses can be either ruled out or incriminated as a causative agent. Several possibilities suggest themselves in explanation of the negative findings reported here.

It is conceivable that latent viral infections may be involved. Latent viruses are difficult to demonstrate, as they do not manifest themselves until they are unmasked by certain environmental conditions or by use of special technics. Possibly the physiological changes that occur in pregnancy are sufficient to unmask a latent infection and cause an untoward effect on the developing embryo. With new technics in cell culture methods being developed, the detection of latent viral infections may be demonstrated more readily.

Another possibility might be that an inapparent infection existed in some of the animals studied. Giroud *et al.*[11] showed that an inapparent infection with *Rickettsia prowazekii* in rats caused a high incidence of embryonic mortality. When the organism was inoculated into pregnant rats from the 6th to 11th day of gestation, it was found that 40.9% of the fetuses were absent at 20 days of gestation. Implantation sites were still evident in the uteri, which indicated that fetuses had been present previously. The infected pregnant rats showed no signs of the infection and the only means by which infection could be detected was by recovering organisms from the peritoneal fluid and demonstrating agglutinins in the blood stream. The rickettsial organism could not be demonstrated in the reproductive tract.

Mixed infections of viral and bacterial origin must also be considered, as they occur in swine influenza and possibly in the shipping fever complex. Madin[12] stated that in the future more emphasis may be given to the possibility of mixed viral and bacterial infections.

Summary

Forty-seven bovine uterine samples were cultured for the presence of viruses, using embryonated egg and bovine kidney cell cultures. Most of the samples were taken from cows with histories of repeated services without conception. The yolk sac, allantoic cavity and the chorioallantoic membrane of the embryonated egg were inoculated and 3 to 7 blind serial passages were made. One to 4 passages in bovine kidney cell cultures were made and examined for cytopathogenic effects. Evidence of viral infection was not detected by these methods.

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Fertility Examination of the Ram

John B. Herrick, D.V.M.

Benefits of fertility evaluation of the bull have created interest in adaptation of the program in rams. The problems are very similar and the need is proportionately as great in sheep as in cattle.

Although the sheep industry does not demand the veterinary services that exist in the cattle industry, the problems and wastage from disease and parasites are beyond ignoring. Veterinarians have been accused of disregarding the sheep industry much as some veterinarians neglect the poultry industry. Basically, the problem has been low value of the individual animal. Veterinary service should be rendered on the flock basis.

Fertility evaluation or determination of breeding ability is part of the veterinary services that can be rendered on a flock basis. The veterinarian can be of great assistance to a flock owner in selection of the ram as to type, conformation and management. Advising the owner to shear the ram during summer and maintain it in cool shelters will enable the ram to enter the breeding season with a higher fertility rate.

Sheep breeders have found that leaving a tuft of wool on the brisket of the ram, then painting it frequently during the breeding season, will aid in determining the breeding activity of the ram. Changing colors at the end of 18 days makes it possible to identify the ewes that do not conceive on first service. Rams normally cover more ewes adequately if turned in for breeding only during night hours.

Prior to breeding season, a ram should be evaluated for breeding ability. The physical examination should include thorough examination of the reproductive tract for evidence of epididymitis. Teeth, eyes, feet and legs should also be included in evaluation of the ram's breeding soundness.

Semen evaluation may be accomplished with the same procedure as used in bulls. Electroejaculation follows the same pattern. A regular electroejaculator may be used but a smaller rectal probe is necessary for rams. A probe 8 inches long and 1 to 1½ inches wide suffices. The ram is best confined in a crate, with head tied down with a halter. The probe is inserted and must be held in the rectum by an assistant. Mild intermittent stimulation of not over 3 volts will produce an erection and frequently protrusion of the penis through the sheath. Stimuli of 5 volts usually will produce ejaculation, although 7 to 8 volts are sometimes necessary. Rams appear more prone to ejaculate in the sheath than bulls. However, digital pressure on the sigmoid flexure frequently produces protrusion of the penis.

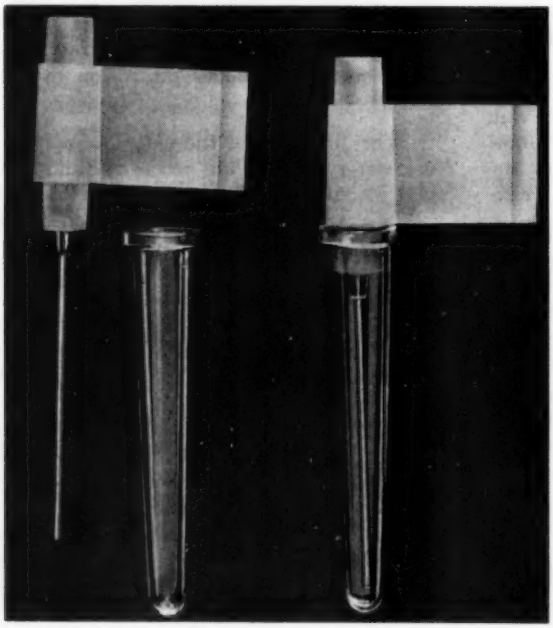
The first part of the ejaculate may be very watery. These are accessory fluids. A good ejaculate will have a swirling motion and a creamy appearance when observed with the naked eye. The average ejaculate will not be over 1 cc. and will contain 2 to 3 billion sperm. Thus the technician examining bull semen must be aware of the amount and concentration of ram semen as compared to bull semen. Semen with good motility, with not over 15% dead spermatozoa nor more than 10% abnormal sperm is considered normal. A high percent of abnormal sperm (25%) from an ejaculate indicates questionable fertility of the ram.

Veterinarians in sheep-raising areas have a service to render to the livestock man. Fertility evaluation of rams is part of this service.

Disposable Self-Measuring Blood Dilution Pipette

This article was abstracted from the September, 1961 Small Animal Clinician for the benefit of the large animal practitioner. We believe this instrument (Unopette, Becton-Dickinson, Rutherford, New Jersey) will make it possible for the practitioner to routinely use blood counts as an aid in diagnosis. The pipette fills by capillary action and dilutes with a premeasured volume of clean, self-contained diluent. It is disposable, thus eliminating the task of cleaning pipettes.

Fig. 1.



The pipette consists of a straight thin-walled uniform-bore capillary tube fitted into a plastic holder (left). A shield is provided to protect the tube (right). An attachable plastic reservoir containing a premeasured volume of diluent completes the assembly. This assures an always perfectly clean, uncontaminated diluent. The diluent reservoir is opened by pushing the plug in with the thumb before collecting the blood.

Blood or other liquid is drawn by capillary action into the tube immediately on contact with the tip of the tube (Fig. 2). The tube will fill by capillary action even at an angle of 30 degrees from the horizontal. The flow into

Fig. 2.

the tube stops when the liquid has reached the end of the capillary. This eliminates any human error that may result in drawing blood to the scribe mark.

After the blood is collected in the capillary tube, the dilution is made by introducing the capillary in the reservoir (Fig. 3). The walls of the reservoir are squeezed slightly to create a negative pressure when they are released and the blood is drawn from the capillary into the diluent. The capillary tube is rinsed with diluent by gently squeezing the reservoir (Fig. 4). This forces fluid into the capillary and overflow chamber. When pressure is released the diluent is drawn back into the reservoir. The rinsing may be repeated as often as necessary but once is usually sufficient. The blood is diluted 1:100 in 1% mold-inhibited acetic acid.

Fig. 3.

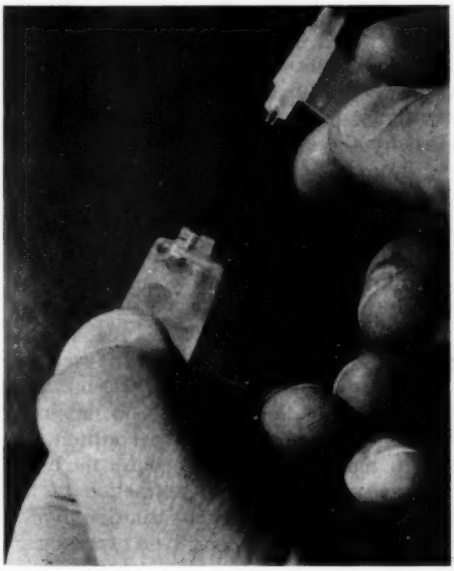
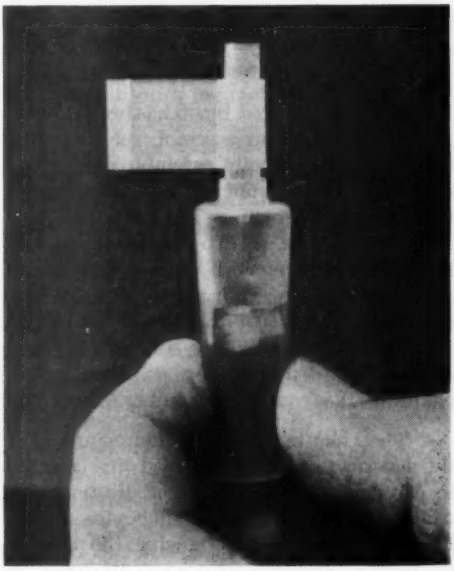


Fig. 4.



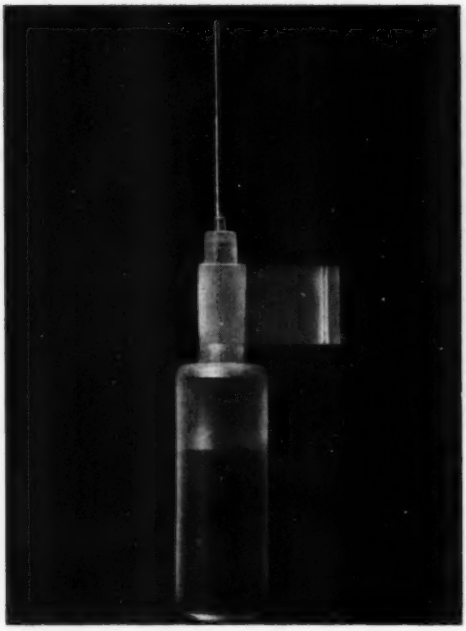


Fig. 5

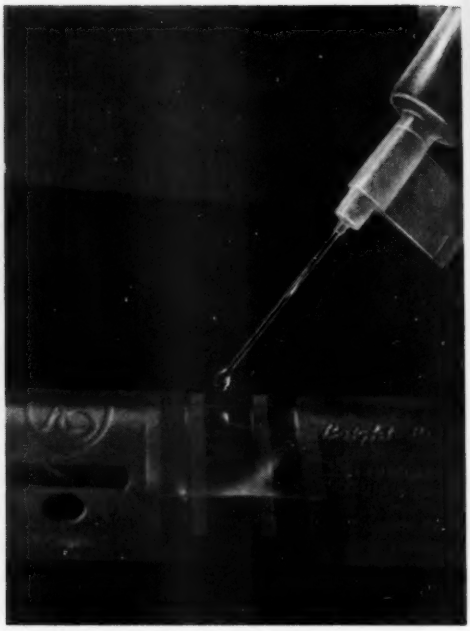


Fig. 6

After dilution of the blood and rinsing of the capillary are completed, the pipette assembly is shaken to insure uniform distribution of the blood in the diluent. Due to the cylindrical design of the reservoir and the fact that it is not completely filled with liquid, uniform distribution of blood is readily effected by vigorous shaking for 10 to 15 seconds.

After the diluted blood has been shaken, the dilution pipette assembly is converted into a dropper pipette assembly by removing the capillary from the reservoir, reversing it and reattaching it to the reservoir as shown in Fig. 5. To charge the hemacytometer, the reservoir, which now serves as a bulb, is squeezed gently, thus forcing diluted blood out of the capillary in uniform drops as shown in Fig. 6. Several drops of diluted blood are expelled before charging the counting chamber.

The cells in all nine 1 mm. squares in the leukocyte area of the grid are counted to compensate for the greater dilution. To calculate the number of leukocytes in the original undiluted blood using the disposable pipette, 10% is added to the total number of cells found in the 9 squares and the sum is multiplied by 100.

> Example: Cells in nine 1 mm. squares = 80
> Calculation: $(80 + 10\%) \times 100 = 88 \times 100 = 8800$

The counting procedure and calculations used with the disposable pipette for erythrocyte counts are identical with those used for the glass red cell dilution pipette.

Many sources of inaccuracies associated with the collection, dilution and enumeration of blood cells are eliminated or greatly minimized in the disposable pipette. Among these are: (1) Error in measuring the volume of blood collected, (2) Error in measuring the volume of diluent, (3) Mixing error, (4) Error associated with variation in the size of the tip of the pipette influencing the size of the drop of blood presented to the counting chamber. In addition this pipette makes it possible to collect the blood and make a dilution in a fraction of the time required with the glass dilution pipette without any technical skill or experience.

Phenothiazine Induced Keratitis in Calves and Kids. Fifteen calves of a group of 95 and 4 kids of a group of 29 developed a photosensitization keratitis within 6 to 10 days following medication with phenothiazine. A profuse lacrimation developed on the 3rd or 4th day. This was followed by photophobia and corneal opacities with highly injected mucous membranes in 6 to 10 days. If the eyes were treated with a silver nitrate solution followed by saline irrigation or dusted with Calomel-Acid Boric followed by a saline irrigation the opacities resolved in 6 to 15 days. If not treated at this stage, corneal ulcers developed. The ulcers started at the center of the cornea and gradually spread over the entire surface. At this stage no treatment would help.

The Indian Vet. Jour., 38:400, 1961.

Seasonal Incidence of Sheep Nematode Parasites. A survey of sheep nematode parasites was carried out on 3 farms. Results over one season indicated that the predominate parasite was *Haemonchus contortus.* Egg counts of this parasite rose sharply in the spring and to a lesser extent in the autumn. *Oesophagostum columiaum* was present to a lesser extent but showed the same seasonal trend in egg counts. *Trichostronglus spp.* were present in low numbers. Egg counts of this parasite rose during the winter months. *Nematodirus spp.* were present in lambs in small numbers as *N. spathiger* and *N. filicollis.*

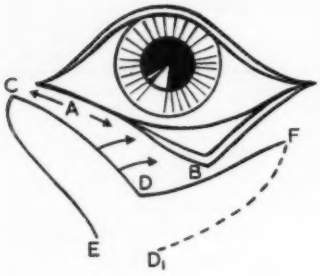
Effect of Vitamin B_{12} on the Hematological Picture of the Race Horse. The author resorted to use of Vitamin B_{12} and iron supplement in the ration of a race horse that was going to higher altitudes for racing within 3 weeks. From November 19th to December 10th this medication boosted the packed cell volume in percent from 49 to 61, the hemaglobin in gm. percent from 18.0 to 21.3 and the red cell count from 10.8 million to 14.1 million.

Jour. S. African Vet. Med. Assn., 32:95, 1961.

Correction of Simultaneous Ectropion and Entropion. A Saint Bernard dog was brought for surgery with a history of a prior operation for an entropion 2 years previously. The lower eyelid was deformed, being drawn downward and tense at point B. An entropion existed in the medial canthus (A). The skin of the face was loose.

A flap (DCE) was dissected loose from subcutaneous tissue. The apex of the flap lay just beneath the medial canthus of the eye and pivot point D lay about 1/3 of an inch medial to the tensest point of the lid (B).

(cont'd on page 466)



The skin was incised along the line FD to prepare a bed for the flap. Careful subcutaneous dissection was done to form the wedge-shaped defect DFD_1. Flap DCE was transposed in direction of arrows to lie in bed DFD_1. The small protruding fold at D_1 was cut off. Defect DCE was repaired by suturing CD to CE. Fine catgut was used for all suturing.

The Vet. Record, 72:884,1961.

Assessment of Various Methods of Treating Bovine Papillomatosis. No beneficial results accrued from the use of local or systemic arsenic, anthiomaline alone or in combination with arsenic, nor from calcium disulfide or imported vaccines. Bismuth salts had some effect but no complete cures were obtained.

Very good results were obtained from the use of both 10% and 25% podophyllin ointment in liquid paraffin. It was applied twice weekly to the neck of the warts and thus was impractical on a large-scale basis. Ten percent formalin applied daily to small warts was also effective but impractical. Ligation with elastrator bands removed the warts in about 14 days but they reappeared.

An autogenous vaccine proved to be a highly effective, inexpensive cure. It was prepared by removing representative types of warts, cutting away the keratinized tissue, mincing remaining tissue, and adding 20 cc. of 50% glycerine-saline. The mixture was thoroughly shaken, and left to stand for 2 to 3 days. It was then strained through muslin and filter paper. Affected calves were injected subcutaneously with 10 cc. of the remaining fluid. This was repeated in 10 to 14 days.

Jour. of S. African Vet. Med. Assn., 32:59, 1961.

Sterilization of Instruments With Beta-propriolactone. Beta-propriolactone is used in laboratories for inactivation of viruses and bacteria. Editors of the South African Journal, *The Pennant,* have proposed a simple method of application for use by practitioners in the field. Instruments immersed in water containing 1.0% beta-propriolactone and 0.2% sodium bicarbonate will certainly be sterile after half an hour and are ready for use after rinsing in sterile water. The bicarbonate is added to control pH, which may fall to 4 or 5 and thus corrode metal. The beta-propriolactone should be carried in the concentrated state; diluted with water, as it rapidly hydrolyzes to the inactive beta-hydroxyproprionic acid. In the undiluted form, it is toxic to skin, eyes and mucous membranes. Inhalation of vapors produces headache, sweating, tachycardia, epigastric distress and malaise. With ordinary care it presents no hazard.

The Pennant, 34:10, 1961.

Metabolic Response of the Surgical Patient to Trauma

Nutritional and Neuro-Endocrine Considerations with Diagnosis and Treatment of Abnormal Responses

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Purdue University
Lafayette, Indiana

A real challenge in the frontiers of surgery is understanding and clinically applying the animal's metabolic adaptation to trauma. Surgical trauma to a previously healthy animal is followed by a characteristic and predictable neuro-endocrine and metabolic series of events which change from one phase into another until convalescence is completed. The surgeon's responsibility is to recognize whether the operated animal will respond appropriately. If so, then minimal therapeutic intervention is indicated. Meddlesome interference may convert a good metabolic response to an abnormal one. Failure to recognize inadequate or abnormal response to surgical trauma may result in the loss of an opportunity to convert it to a normal metabolic response.

In general terms, the surgeon can detect the patient in which an abnormal response is likely to occur and can take appropriate anticipatory therapy. The surgeon should pause preoperatively to consider the patient's estimated response to trauma. Will his endocrine response be immediate or delayed? Is he debilitated or healthy, dehydrated, obese, suffering from infection or malignant disease? Is convalescence predicted to be rapid and sure, or slow and uncertain? Where should therapeutic interference be interjected?

Powerful metabolic forces within the animal are at work, the aggregate of which results in successful recovery. However, these defense mechanisms lose efficiency in the presence of shock, dehydration, hemorrhage, starvation, infection, necrotic processes and malignant diseases. By freeing the patient from such deterring influences, the metabolism of convalescence which is triggered by the trauma itself is allowed free activity.

The greater the magnitude and duration of trauma the greater will be the depth and duration of response. Fig. 1 shows an adaptation of Moore's "scale of ten" by which the magnitude of the trauma can be graded. A severe burn covering a major portion of the body is at the top, while minor injuries are at scale 1. Major gastrointestinal anastomotic surgery is considered

Presented at the Fourth Annual Symposium on Therapeutic Nutrition for Veterinarians, March 31, 1961, Indianapolis, Ind.

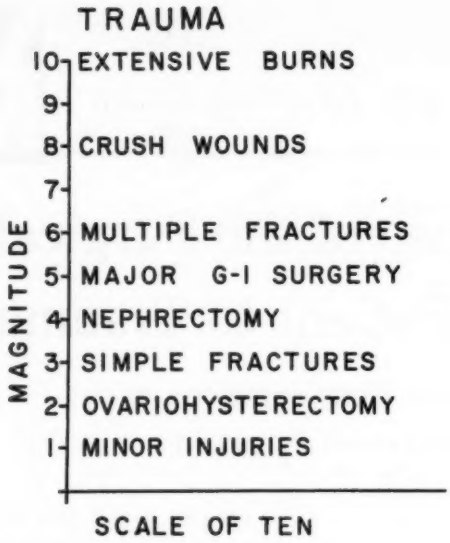

Fig. 1.

in the middle of the scale at 5. This estimate of the magnitude of trauma can be used to aid in anticipating postoperative metabolic events.

Normal Response

The body's response to trauma, whether surgically induced or accidental, follows a definite chain of metabolic events which can be broken down for the sake of discussion into 4 stages.

Stage I. This stage (Fig. 2) is the adrenergic-corticoid phase. We see evidence of increased adrenal medullary activity just before operating or as anesthesia is induced. This includes the well-known effects of adrenalin such as a rise in pulse rate and blood pressure, vasoconstriction of skin vessels, sweating of the foot pads and a rise in blood glucose level.

Upon injury there is an immediate increase in the secretion of ACTH and a consequent increase in adrenal steroid hormone secretion. This is reflected in urinary excretion of the degradation products of these hormones and a drop in the eosinophil count. There is prompt antidiuresis following trauma due to an increased secretion of the antiduretic hormone by the posterior pituitary gland.

An increase in secretion of thyroxine by the thyroid gland is also a part of the metabolic response of trauma. Presumably this is due to increased pituitary output of the thyrotropic hormone. Oxygen consumption of the severely injured is typically elevated in the first few days following trauma. This increased oxygen consumption is directly proportional to the severity of the injury. When wound healing is completed, the rate comes back to normal.

The total body water changes little unless administration of fluids has been greater or less than that necessary to maintain zero balance. Oliguria is the rule because of the increase in antidiuretic hormone. This decrease in urine volume is a favorable sign and a guide to recognition of a good response. Larger volumes of water may be forced but this kind of treatment tends to alter unfavorably the normal metabolic picture.

Sodium is retained due to the high level of adrenal steroids; consequently, kidney excretion of sodium drops to zero or very low levels. One would expect a rise in the serum sodium concentration, but paradoxically, the serum concentration falls, the hyponatremia being in direct proportion to the magnitude of the trauma. It occurs despite marked sodium conservation by the kidneys and lasts for 2 or 3 days. In absence of extrarenal losses and cardiac or renal disease, this is a favorable sign and should not be tampered with therapeutically.

On the first postsurgical day, urinary excretion of potassium is high, depending again on the magnitude of the trauma and due to the increase in secretion of adrenal steroids. This excretion falls gradually on the 2nd and 3rd days, but the serum potassium concentration does not change. Chloride, in general, follows the renal and sweat pattern of sodium, but no specific noteworthy changes occur. The bicarbonate concentration may decrease slightly.

STAGE I
Adrenergic Corticoid
(1-2 DAYS)

ENDOCRINE EVENTS	Increased Activity a. ACTH b. ADH c. Thyroxine d. Adrenal cortex and medulla
SODIUM	Excretion Decreases
POTASSIUM	Excretion Increases First Day Excretion Decreases 2nd-3rd Day
NITROGEN	Excretion Increases Negative Balance
URINE VOLUME	Decreases
EOSINOPHILS	Sharp Fall
CLINICAL CHARACTERISTICS	Apathetic and Listless Disinterested Slight Temperature Elevation Oliguria

Fig. 2.

A negative nitrogen balance exists because of 2 factors, absent intake and an increased rate of urinary nitrogen excretion. The increased excretion rate is in direct proportion to the magnitude of the trauma and is a consequence of increased secretion of adrenal steroids. Because there is no nitrogen intake, this nitrogen loss can be assumed to be derived from intracellular protein. The nitrogen excretion rate decreases progressively in the next day or two of stage I. The negative nitrogen balance which exists cannot be converted to a positive balance in this stage. Excretion rates rise further if nitrogen as oral food or parenteral amino acids is given at this time. This negative nitrogen balance is part of a good response and therapy to alter it constitutes ill-advised interference, tending to convert to an abnormal response.

The body's utilization of large amounts of calories at this stage is highly improbable, so the caloric requirements are low and easily supplied by parenteral glucose solutions. In this first stage the animal is apathetic, with little interest in food or surroundings. There is little to be gained by encouraging food intake at this time, but the animal should have free access to water. The return of peristalsis on the 2nd or 3rd day helps identify the end of stage I.

Stage II. This stage (Fig. 3) is the phase of corticoid withdrawal. This phase follows the adrenergic-corticoid stage on about the 3rd day and lasts 1 or 2 days. The eosinophil count rises and the elevated blood sugar level declines, which suggest the adrenal cortex is decreasing its secretion of antianabolic glucocorticoids in preparation for entry into the anabolic stage. A water and sodium diuresis occurs suggesting decreasing adrenal secretion of sodium-retaining steroids and diminution of posterior pituitary output of the antidiuretic hormone. Potassium excretion rates decline sharply about the 3rd day and a marked positive potassium balance ensues. Positive nitrogen balances are slower to occur. The nitrogen excretion rates do progressively fall and gradually reach zero balance. This reflects the decline in catabolic intracellular protein destruction and indicates the animal is metabolically prepared to begin anabolic processes and load nitrogen. At this point the anabolic nitrogen loading processes will not begin unless calories and nitrogen are supplied, preferably as diet, but if necessary, as parenteral solutions. Prescription diet P/D (Hill Packing Co.) is representative of the type of high quality protein diet of high nutritive value that is indicated. By the 3rd or 4th day the animal

Fig. 3.

STAGE II
Corticoid Withdrawal
(2-3 DAYS)

ENDOCRINE EVENTS	Decreased Activity a. Ant. pit b. Adrenal cortex c. Post. pit (ADH) Thyroxine production may continue.
SODIUM	Excretion Increases
POTASSIUM	Excretion Decreases
NITROGEN	Excretion Decreases
URINE VOLUME	Diuresis
EOSINOPHILS	Increases
CLINICAL CHARACTERISTICS	Increasing Activity and Interest Food Interest Fever Declines Diuresis

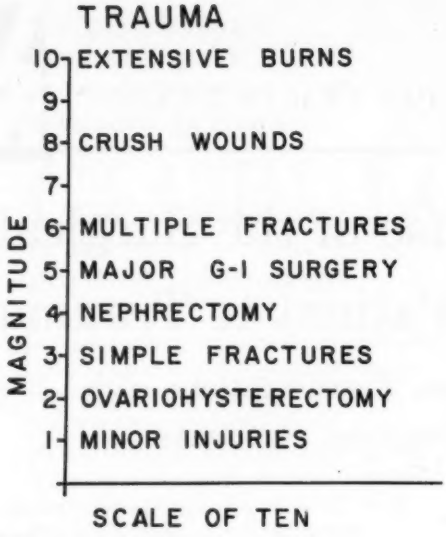

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Fig. 3.

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(2-3 DAYS)

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NITROGEN	Excretion Decreases
URINE VOLUME	Diuresis
EOSINOPHILS	Increases
CLINICAL CHARACTERISTICS	Increasing Activity and Interest Food Interest Fever Declines Diuresis

STAGE III
Spontaneous Anabolism
(5-15 DAYS)

ENDOCRINE EVENTS	Resting Levels of: a. ACTH b. Cortical steroids c. Posterior pituitary
SODIUM	In Balance
POTASSIUM	Weak Positive Balance
NITROGEN	Positive Balance
URINE VOLUME	Normal
EOSINOPHILS	Resting Level
CLINICAL CHARACTERISTICS	Good Appetite Activity Increases Normal Urine Output

Fig. 4.

usually displays an increased interest in food and activity but may have little energy or staying power. Chloride and bicarbonate levels show no significant changes.

Stage III. This stage (Fig. 4) is the phase of spontaneous anabolism reflecting a return to a resting level of secretion of antianabolic hormones. Total body water levels increase and electrolyte concentrations are about normal. Weight gain begins and is proportional to the positive nitrogen balance. By the 5th or 6th day the animal has real hunger and is quite active. Now is the time to encourage intake of a good quality, nutritive diet. If such a diet is fed, supplementary vitamins are not necessary, but B complex vitamins may stimulate the appetite to some extent if such is necessary.

Figure 5.

STAGE IV
Weight-Gain
(DAYS or WEEKS)

ENDOCRINE EVENTS	Resting Levels
SODIUM	Zero Balance
POTASSIUM	Zero Balance
NITROGEN	Zero Balance
URINE VOLUME	Normal
EOSINOPHILS	Resting Level
CLINICAL CHARACTERISTICS	Regains Lost Weight Return of Strength and Vigor

Stage IV. This stage (Fig. 5) is the phase of weight gain. This phase may go on for days or weeks. The animal regains lost body weight and frequently gains beyond original weight. Nitrogen is in balance, the caloric intake is adequate and strength and vigor return. In this phase the animal can return to his maintenance ration.

Diagnosis and Treatment Of Abnormal Responses

Thus far this paper has shown the normal animal's response to trauma and how little intervention is necessary from a nutritional standpoint other than providing a balanced diet. The greatest clinical problem is recognition and treatment of the abnormal responses to surgical trauma. They can be categorized into 4 types. Seldom are pure abnormal states seen, since it is common for several types of responses to overlap in the same animal, but they will be discussed as separate entities.

Excessive Response. The first type is the excessive response (Fig. 6) which differs from normal response only in depth and duration. This abnormal clinical picture after surgery is not difficult to recognize for an alert practitioner who integrates the clinical with the predicted metabolic response. Development of excessive response can be frequently anticipated when massive trauma is known to have occurred. The change from the 1st stage to the 2nd stage of convalescence is slow to appear and is a consequence of prolonged or extensive surgery. Clinically the animal's listlessness and apathy persist beyond the 3rd and 4th postsurgical day. This is the type of animal that appears to give up and is said to lack the will to live. Peristalsis remains sluggish or absent. Disinterest in food persists. The temperature remains elevated. Weakness, depression and lack of initiative are obvious.

The eosinophil count may be low or zero for many days. The initial increased nitrogen excretion rate continues or increases beyond the 4th day and the negative

EXCESSIVE METABOLIC RESPONSE

CHARACTERISTICS	1. Massive trauma. 2. Response deep and sustained. 3. Negative nitrogen balance. 4. Potassium excretion high. 5. Sodium excretion zero. 6. Eosinophil count zero. 7. Hypokalemic alkalosis. 8. Apathy and anorexia.
TREATMENT	1. Prevention: a. Avoid excess trauma. 2. Don't give steroids. 3. Potassium after the 4th day. 4. Calories and nitrogen after the 3rd day. 5. Testosterone after the 3rd day.

Fig. 6.

nitrogen balance continues. In this excessive response the kidney continues to waste potassium, and its excretion proceeds unabated. As this proceeds, hypokalemic alkalosis results with the usual high serum pH, high bicarbonate, low chloride, normal or low sodium levels, oliguria and weakness. Potassium therapy should be administered after the 3rd or 4th day in sufficient quantities to replace renal as well as any extrarenal losses. The important feature is to initiate potassium therapy before metabolic alkalosis becomes established. Ionosol G (Abbott Lab.) is representative of the type of solution containing potassium that should be used. Remember that the administration of isotonic saline solution aggravates this condition because it promotes the increased loss of potassium from the body and a positive sodium balance accelerates development of alkalosis. If the alkalosis is severe, use Ion-o-trate potassium chloride (Abbott Lab.) added to 5% dextrose solution.

Prevention constitutes the best therapy. Avoid surgical trauma to as great a degree as possible in order to prevent this abnormal metabolic state. It is known that convalescence will not and cannot go to successful completion unless calories are provided in the anabolic stage. It becomes important to administer calories and nitrogen in quantity after the 3rd or 4th day even though the animal shows no desire for food. It is not desirable and practically impossible to put the animal in positive nitrogen balance before this. Such attempts simply result in a further increase in nitrogen excretion rates.

The value of testosterone in the traumatized male is not known but in the healthy, nontraumatized animal, testosterone decreases nitrogen excretion and promotes anabolization of nitrogen. Therefore, testosterone therapy may aid in overcoming negative nitrogen balance if given at this time. From time of surgery, extrarenal losses of water and electrolytes should be replaced daily as accurately as possible in an amount determined by estimation of losses by diarrhea and vomiting. Generally speaking, losses by diarrhea are replaced with balanced solutions of electrolytes also containing sodium lactate such as Ionosol D (Abbott Lab.) Losses by vomiting are replaced by solutions containing the chlorides to combat mild alkalosis such as Ionosol G. The surgeon must be constantly alert to the clinical signs and biochemical criteria signaling entry into an anabolic phase and at this point encourage a greater caloric intake.

Extrarenal Response. The second type of abnormal response to surgical trauma is the extrarenal response (Fig. 7). This occurs in the animal which may be sustaining losses of water, electrolytes and nitrogen through avenues other than the kidneys. Thus the animal's body becomes

Fig. 7.

EXTRARENAL METABOLIC RESPONSE

CHARACTERISTICS	1. History of losses through other than the kidney 2. Negative nitrogen balance 3. Potassium excretion decreased 4. Sodium excretion minimal 5. Dehydration 6. Thirst
TREATMENT	1. Anticipate extrarenal response 2. Continual replacement 3. Delay surgery 4. Initiate oral intake

depleted of essential substances which if great enough block the normal convalescent pattern. Water losses may be due to simple lack of intake with continued obligatory losses. More often the deficits are multiple, consisting of water, electrolytes, nitrogen and fat resulting from intestinal obstruction, diarrhea, vomiting, thermal injuries or massive exudates. If the animal is not taking in any calories, it will be losing calories as it metabolizes its own tissues. One should be alert to development of the extrarenal response in an animal with history of losses from any avenue. In these animals dehydration is marked. Thirst may or may not be evident, depending on absence or presence of sodium losses. Thirst is present with pure water loss but absent in cases of pure sodium depletion. Animals with the extrarenal response are not as listless and show more inclination to fight. As has been pointed out, potassium depletion may be seen if large extrarenal losses of potassium have occurred. The urine volume is usually low because of decreased extracellular water and inadequate perfusion of the kidneys with consequent decrease in filtration. The specific gravtity will be about 1.010.

The negative nitrogen balance is out of proportion to estimated magnitude of the trauma and is usually refractory to administration of large amounts of amino acid nitrogen postoperatively. It should be noted that loss of nitrogen is through the lower intestinal tract.

Treatment of the extrarenal response is the prompt and continued effort to replace the extrarenal losses. The vigorous use of mixed electrolyte solutions, protein hydrolysate and whole blood transfusions for as long as necessary constitutes the main therapy, along with continued efforts to initiate oral intake of food and water.

The time spent in correcting extrarenal depletions prior to further surgical trauma is always well spent. It is well to be aware that the animal with extrarenal depletions will respond inadequately metabolically to much less surgical trauma than it would when its losses are restored. The animal with extensive extrarenal depletions after surgery will manifest minimal mobilization

DEPLETION METABOLIC RESPONSE

CHARACTERISTICS	1. History of: a. Chronic illness b. Previous trauma c. Malnutrition 2. Striking decrease in magnitude and duration 3. Little apathy or depression 4. Slight negative nitrogen balance 5. Potassium excretion rises very little
TREATMENT	1. Prevention a. Repeated blood transfusions b. Protein hydrolysate c. Delay operation 2. Early intake of food 3. Caloric solutions

Fig. 8.

of nitrogen. This may result in dehiscence of the wound.

Depletion Response. The third type of abnormal response is the depletion response (Fig. 8). This is seen in animals with a chronic illness, in various stages of malnutrition, or which first sustained accidental trauma and then a few days later underwent surgery. The depletion response is characterized by a striking decrease in both magnitude and duration of the response. Such an animal has a much shorter adrenergic-corticoid stage, is liable to edema and sodium retention, hypoproteinemia and wound dihiscence.

Prophylaxis provides the best management. Whenever possible, the surgeon should recognize and prepare to treat an animal likely to manifest a depletion response. Small amounts of whole blood given prior to surgery will aid an animal to carry out a more normal metabolic response. The preoperative administration of a protein hydrolysate to a depleted patient is effective when given with adequate calories. If necessary, the operation should be postponed until the patient can be fortified with calories, electrolytes, water and adrenal steroids which enable it to withstand surgery and carry convalescence to completion. Dextrose and steroids should be given by the 2nd postoperative day. Protein hydrolysates possibly should be given by this time. Electrolytes are usually not needed

HYPOADRENAL METABOLIC RESPONSE

CHARACTERISTICS	1. History of prolonged convalescence in previous surgery or illness. 2. High eosinophil count post trauma. 3. Elevated B.U.N. 4. Sodium excretion increased 5. Potassium excretion decreased. 6. Therapeutic response to cortisone.
TREATMENT	1. Preoperative preparation with saline, cortisone, and DOCA. 2. Adrenal steroids.

Fig. 9.

because there has been less change in the electrolyte pattern.

Hypoadrenal Response. The last abnormal response is the hypoadrenal response (Fig. 9). This response is not commonly recognized in animals, but probably is responsible for sudden death of surgical patients 4 to 24 hours following surgery. These animals usually have a transient or chronic adrenal insufficiency of varying magnitude and a history of prolonged or turbulent convalescence from some prior illness or surgical procedure. Along with a decline in blood pressure an oliguria is always present and a decrease in the glomerular filtration rate. The urine has a high concentration of sodium and a low concentration of potassium due to failure to resorb sodium and excrete potassium and a low level of mineral corticoids. The eosinophil count is high.

Management consists of administration of cortisone and desoxycorticosterone acetate. It is probably a sound therapeutic practice to administer steroids to any surgical patient with a history of chronic illnesses, previous trauma, starvation, emaciation or elevated blood urea nitrogen levels.

Whether the surgical procedure is urgent or not, it is always important to speculate whether the patient is expected to have a normal response to trauma and if not, what abnormal or combination of abnormal responses it is apt to have. The exercise of going through this kind of thinking in relation to the particular animal at hand will pay invaluable dividends in anticipating the abnormal before it really becomes a serious problem. The success of therapy of abnormal surgical convalescence is in direct ratio to how early therapy is begun. This in turn depends upon the surgeon projecting his estimates into the first few postoperative hours and days as he evaluates his patient's endocrine and metabolic adaptations to the trauma to come.

Summary

The normal, healthy animal responds in a uniform manner to trauma. It passes through the recognizable (1) adrenergic-corticoid phase, (2) corticoid withdrawal phase, (3) phase of spontaneous anabolism, and (4) phase of weight gain. The greater the depth and duration of the trauma the greater will be the depth and duration of the response.

The abnormal metabolic responses are categorized as (1) the excessive response, (2) the extrarenal response, (3) the depletion response, and (4) the hypoadrenal response. The surgeon should be alert to recognize and anticipate the metabolic events following trauma, since failure to recognize inadequate or abnormal response to surgical trauma may result in the loss of an opportunity to convert to a normal metabolic response.

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Case Reports: Termination of a Femoral Neck Fracture

These radiographs illustrate that fracture of the femoral neck may not necessarily be accompanied by resorption. If the fracture occurs distal to the attachment of the joint capsule and is held in reduction so the blood supply to the femoral head is not disrupted, healing will follow. This clinical observation is supported by the work of T. C. Fitzgerald which was reported in the September 1961 issue of VETERINARY MEDICINE. He found the blood supply to the head of the canine femur is from 3 sources: (1) by way of the synovial membrane plexus, (2) arterial supply by way of the ligamentum teres and (3) branches from the nutrient artery of the femur which penetrate the epiphyseal scar. The most constant and chief supply was observed to be the synovial membrane plexus.

Case I.

Above: A fracture of the left femoral neck without displacement. Right: The femoral head appears to be resorbing 4 weeks after the fracture. This appearance is caused by hyperemia which accompanies healing. The limb is not bearing weight.

The dog 8 weeks after the apparent resorption. Normal density has returned to the head and neck of the femur. This was accompanied by the return of weight bearing.

Case 2.

A fractured femoral neck and pelvis is illustrated by this radiograph. The blood supply to the neck of the femur has been badly disrupted. The joint capsule has been torn and the femoral neck completely severed. Resorption of the femoral head usually occurs following these fractures. A femoral head prosthesis is indicated for repair of these cases.

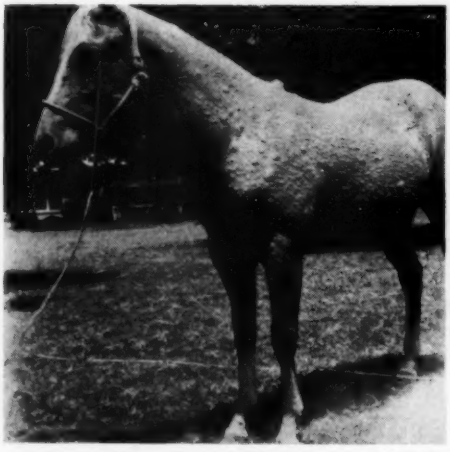
Case report and radiographs were submitted by William I. Gay, Animal Hospital Section, Public Health Service.

Observations and notes on equine practice gleaned from 40 years of veterinary experience by A. H. Quin, D.V.M.

Equine Urticaria

Nettle rash, hives or urticaria is possibly less frequent in horses than in cattle but is not uncommon. Sensitizing plants or weeds are usually incriminated in cattle. The factor that pulls the trigger is usually missing in the horse. The symptoms appear suddenly, with no prodromal manifestations. The skin elevations cover part or all of the body. They are circular, raised, quite firm and from silver-dollar size to 2 inches in diameter. Occasionally a slight icterus of the eye membranes is seen, which indicates a possible liver involvement.

Among the possible triggering agents, one may include injection of any heterologous protein such as vaccines or serums, noxious pasture plants or weeds, molds and, it is thought by some, sensitization to the proteins of bots or intestinal nematodes.



A case of generalized urticaria.

Whatever the cause, generalized urticaria calls for treatment with an intravenous injection of your antihistamine of choice, a light purge such as Istizen or a quarter-grain of arecoline and bathing the body surface with thiosulfate of soda solution (½ lb. per gal. of water).

Foaling Practice Tips

A suitable formula for feeding an orphan foal is 10 oz. of whole cow's milk, 12 oz. of lime water and 2 oz. sugar. For the first week of life give 2 oz. at 2-hour intervals.

In the routine handling of newborn foals, do not sever the umbilical cord until pulsations cease, then soak the stump with tincture of iodine. Within the first 24 hours administer a lukewarm enema, a dose of penicillin-streptomycin and tetanus antitoxin.

Persistent urachus (nonclosure of the urachal tube or channel through which fetal urine empties into the allantois) is more common in male than in female foals. The result is urine dribbling from the severed umbilical cord. One should first prove that the urethra is pervious by passage of a human catheter or length of small polyethylene tubing. If so, the terminal urachus is cauterized with a stick of silver nitrate and closed with a suitable suture.

Treatment of Equine Summer Sores with a Systemic Insecticide

J. D. Wheat, D.V.M.
Davis, Calif.

During the summer season in warm climates horses are commonly affected with summer sores or cutaneous habronemiasis. These lesions begin as an inflammatory swelling of the skin, with an intense pruritus which causes the horse to bite or rub the area until it becomes ulcerated. The lesions vary in size and characteristically have an uneven surface which consists of a soft brownish-red material covering a mass of firmer granulations. Chronic lesions sometimes develop into granulomas of considerable size.

The condition is caused by the presence in the skin of equine stomach worm larvae, *Habronema* spp., which are deposited in open wounds by infected flies. The larvae are not able to penetrate the unbroken skin. A nodular conjunctivitis has a similar cause and has been produced experimentally with larvae of *H. muscae*. Of the 3 species of *Habronema*, 2 are transmitted by the common housefly, *Musca domestica*, and the other by the stable fly, *Stomoxys calcitrans*. During the maggot stage, flies become infected by ingesting the larvae which are passed in the manure. If infected flies are swallowed in food or water, the larvae mature into adult parasites in the stomach of the horse. Necropsy examination of some horses, especially those affected with cutaneous habronemiasis, has revealed numerous small, hard, yellowish-gray nodules in the lungs. Microscopically

Habronemiasis of the Prepuce.

Habronemiasis of the face. The lesion was raw and ulcerating when the horse was admitted to the clinic, causing it considerable discomfort as evidenced by rubbing its face on any available object. This photograph was taken after the 2nd treatment with ronnel. The wound had dried and was healing. No other treatment was used and horse was kept in pasture between treatments.

these nodules contain a nematode larva, and the central mass is surrounded by eosinophiles and a fibrous capsule.[1]

The lesions occur most often on those parts of the body that are most subject to injury, such as the legs and withers. They do not respond to ordinary wound treatment and tend to increase progressively in size. Healing often takes place spontaneously in the winter, but the lesions may recur the following summer.

Local treatments previously used, such as applications of 10% formaldehyde solution, camphor and phenol in mineral oil, acetic acid, or freezing the lesion with dry ice, have not given very satisfactory results. Phenothiazine also has been given but has not been effective.

More recently, horses with summer sores have been treated with 45 gm./1,000 lb. body weight of an organic phosphorus insecticide, ronnel (Ectoral, Pitman-Moore) using 2 gm. boluses. In order to administer the boluses conveniently, they are placed in warm water until softened sufficiently to be broken up, after which the suspension is given by stomach tube. The dose is repeated every 2 weeks until the lesions are healed and usually monthly during the fly season. Although such monthly treatments may not be necessary, they appear to be good insurance against development of new lesions.

Local treatment is also given. This consists of excision of excessive granulation tissue when present, cleansing, and application of white lotion under a bandage. The owner is advised to care for lesions that cannot be bandaged by washing the wound daily with hexachlorophene soap, and applying camphor and phenol in mineral oil.

During the past 3 years ronnel has been used in this manner in the treatment of 60 horses with summer sores. The results have been uniformly good, with no toxic reactions. Definite improvement occurred within 1 to 2 weeks in all cases and complete recovery in several weeks.

The diagnosis was confirmed in most of these cases by histopathologic examination, but the history and the lesions are so typical that this procedure ordinarily is not necessary.

Summary

Over a period of 3 years, 60 horses with cutaneous habronemiasis (summer scres) have been treated with ronnel given orally in doses of 45 mg./1,000 lb. body weight every 2 weeks until the lesions are healed. The treatment is continued at monthly intervals after recovery until winter. The lesions are also treated locally. Results have been uniformly good and there have been no toxic reactions with this dosage of ronnel.

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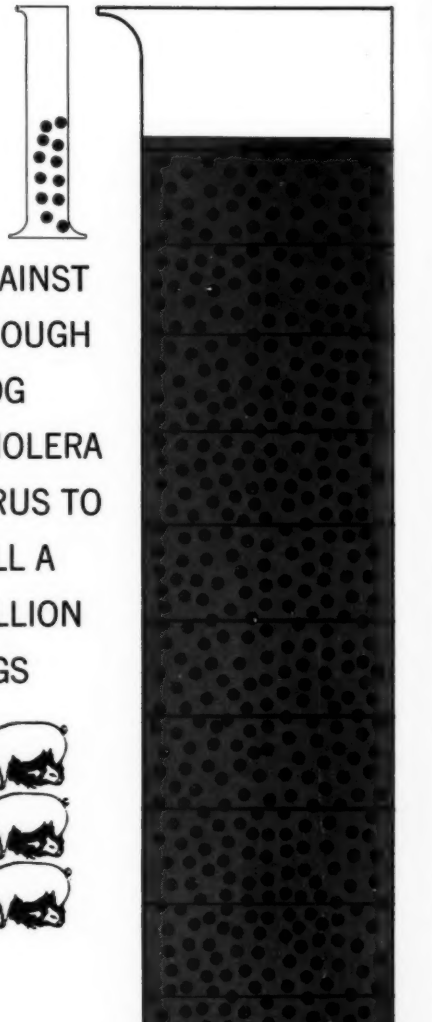

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1. Newberne, J. W., *et al.:* Recent Studies on the Properties of a Nonvirulent Living Hog Cholera Vaccine, 62nd Annual Proceedings, U. S. Livestock Sanitary Association, 1958, pages 278-289.

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VETERINARIANS IN THE NEWS

Van Houweling Appointed To Post At New National Laboratory

Dr. C. Donald Van Houweling has been named assistant director for regulatory activities of the U.S.D.A. National Animal Disease Laboratory, which was newly constructed at Ames, Iowa. Dr. Robert J. Anderson has been named to succeed him as ARS assistant administrator for regulatory programs. Dr. Van Houweling was the director of professional relations for the A.V.M.A. before entering federal service.

Other Veterinarians in the News featured on page 486.

Practice Management and Veterinary News Section

November 1961

PRACTITIONER'S LIBRARY . 479
Veterinarian V. D. Stauffer explains the importance of a well-kept professional library.

DECISIONS IN VETERINARY MEDICINE 481
Another in the series of cases involving practitioners by the legal scholar Howard Newcomb Morse.

HOW PRACTITIONERS ARE ADJUSTING THEIR ACTIVITIES TO THE CHANGING AGRICULTURAL ECONOMY 482
VM reporters cover two Missouri veterinarians who have added profitable sidelines to their regular practices.

WHY SHOULDN'T YOU CHARGE A FAIR PROFESSIONAL FEE? 484
Economist Harold Ashe points out the folly of underpricing your professional service fees.

SPECIAL: See the New Fee Poll on page 484.

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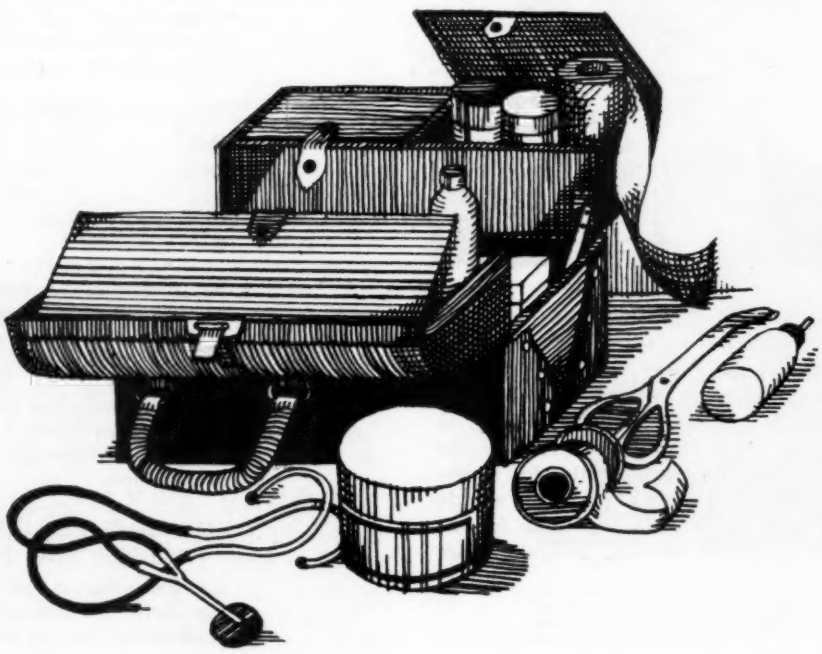
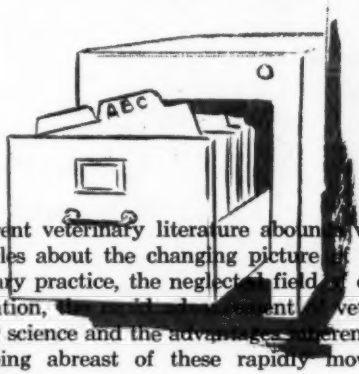


The Practitioner's Library



V. D. Stauffer, D.V.M.
Arvada, Colorado

Current veterinary literature abounds with articles about the changing picture of veterinary practice, the neglected field of consultation, the rapid development of veterinary science and the advantages inherent in keeping abreast of these rapidly moving events.

The volume of current veterinary literature literally swamps the busy practitioner. A conscientious reader must impose upon himself a rigid discipline to regularly read the journals. Even under these conditions he feels much of the material escapes him. This is a source of constant concern whether one is conscious of it or not. Nor does there appear to be any relief in sight. Demands of the complex science of veterinary medicine with its many facets require more and more publications to disseminate current information. Each new publication, however worthy, serves to compound the problem of the individual veterinarian.

Any attempt to save the reader time and effort in his coverage of the voluminous literature looks good on the surface but it is questionable whether this is the proper

attitude for the medical practitioner. Abstracts and brief discussions are fine, but they should not constitute the bulk of the reading habits of practitioners of medicine. Abstracts should be considered a means of reference to the complete article. This is a rather expensive type of reference material.

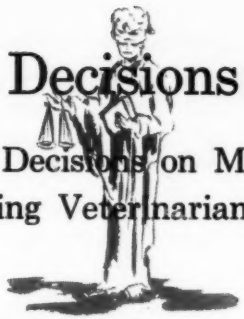
Most veterinary establishments today can be proud of their facilities. Much time, effort and money have been spent on planning of the reception room, the surgery, the laboratory and pharmacy. Too often the library is relegated to an inconspicuous and frequently uncomfortable area not conducive to good reading habits. Not only is the place unattractive but it is impossible to locate reference material quickly.

A library should be the life blood of any medical practice. It should be useful and should be used. It is not enough to have journals and texts in one's possession, but rather it is necessary to have a system of cataloging available for use at all times. There are excellent card index files of subject matter on veterinary literature available commercially at a reasonable cost. Bound volumes of journals conserve space, facilitate reference and make an attractive appearance. Their cost is moderate.

In some communities, the veterinarian's library may be the only source of reference material available concerning the animal sciences. What better public relations project could be devised than to encourage its use by young students of the community. A simple card index file with bound volumes of the journals and systematic arrangement on the shelves create an orderly atmosphere out of an otherwise virtual jungle of publications. Proud should be the man who makes available such facilities to his community.

Libraries are not created overnight, nor are they purchased intact on the open market. Libraries are collected over a period of years. Each item added increases its value. Some items considered quite casually today may be impossible to replace tomorrow.

The veterinarian concerned with agriculture will be spending more time in his library and less time doing some of the menial tasks that consume his working hours today. Let us hope he has had foresight to realize this and has or will start building a library that will enable him to meet the changing demands of his profession.



Decisions in Veterinary Medicine

Court Decisions on Malpractice Suits Involving Veterinarians

by Howard Newcomb Morse

Reasonable Skill Demanded by Court

Daniel M. was the owner of a roan mare which became sick. He engaged Dr. F., a veterinarian, to treat the mare. The doctor visited the mare a number of times, examined her, diagnosed her case, prescribed medicine, gave her drugs and medicines and treated her until she died.

Mr. M. filed an action in the district court against Dr. F. to obtain damages for loss of the mare. Mr. M. contended the doctor was incompetent to treat sick and diseased horses because he did not effect a cure. The court rendered judgment for Mr. M. and the doctor appealed. The supreme court reversed the decision of the lower court. The supreme court stated: "The implied contract of the plaintiff in error (Dr. F.) was not to cure, but to possess and apply in his treatment of the case such reasonable skill and diligence as are ordinarily exercised in his profession . . . The care and diligence required are such as under the circumstances a careful and trustworthy man would be expected to exercise."

A Typical Swine Disease Problem

Paul Ellison was a farmer who was engaged in raising a herd of purebred Spotted Poland China hogs. He noticed that one pig had died and some of the rest of the herd were ill. He called Dr. S., a veterinarian, to examine them. The doctor came to the farm, and after an examination vaccinated the pigs for cholera. Soon thereafter the pigs began to die rapidly until 63 out of a herd of 86 succumbed and most of the remainder of the herd were not "good pigs."

Ellison brought an action in the district court against Dr. S. to obtain damages for the latter's negligence in the diagnosis and treatment of the pigs. Ellison contended that the pigs did not, in fact, have cholera and that the doctor was negligent in wrongly diagnosing and vaccinating for this disease. At the trial the doctor contended there was no evidence of negligence on his part, but nevertheless admitted that the pigs had necro. The court dismissed the case, and Ellison appealed.

The supreme court reversed the decision of the court below. The supreme court declared: "Defendant (Dr. S.) contends that there was no evidence . . . (of) negligence on his part. There was evidence of his admissions that the pigs had necro . . . If so and they were not treated for it, even if they also had cholera, the case would be for the jury."

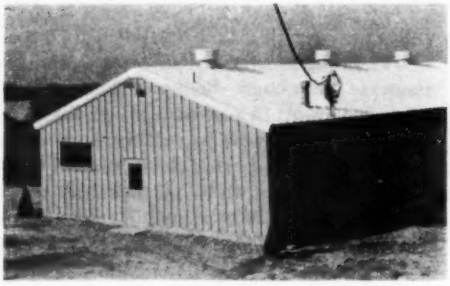
Veterinarian Defined

The legal definition of a veterinary surgeon was handed down by the Supreme Court of Minnesota in the case of Lyford vs. Martin, 79 Minn. 243, 244, 82 N. W. 479, 480. The court stated: "A veterinary surgeon is a person lawfully practicing the art of treating and healing injuries and diseases of domestic animals."

BUSINESS REPORT: How Practitioners Are Adjusting Their Activities to the Changing Agricultural Economy

S.P.F. SWINE LABORATORY EXPANDS VETERINARY SERVICE

Dr. Hugh Wallace, Mound City, Missouri veterinarian, has chosen to pursue his special interest in swine production in a way that offers greater practice opportunity as well as offering a better income potential. Dr. Wallace and several other local veterinarians have invested in an S.P.F. Laboratory and formed a corporation to operate



it. Wallace supervises the Laboratory and employs three full-time people, including a public relations field man who contacts key swine producers in the area to explain the benefits of the program. He also maintains his regular practice to area livestock owners with the aid of a professional assistant.

Dr. Wallace is already looking to the future problems that must be solved. He anticipates the necessity of developing a breeding herd so that anyone interested in the program can have Specific Pathogen Free stock of the highest quality. The in-

vestment in the laboratory is increasing and the risk is considerable, but these Missouri veterinarians are moving to render a service that meets today's needs.

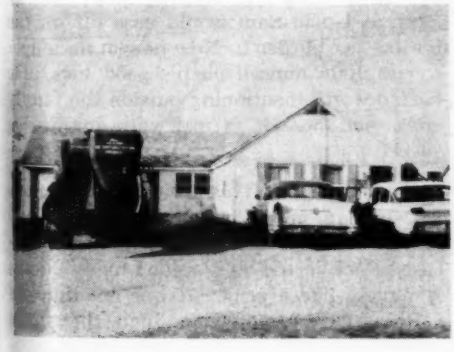
Successful veterinary practices have always been marked by their ability to adjust to changing economic trends and ways of doing business. Several years ago, the equine practitioner shifted his attention to livestock when the horse became less of a factor. Today, general practitioners are searching out ways to maintain and increase their practice. This article reports on two successful adjustments to the agricultural economy.

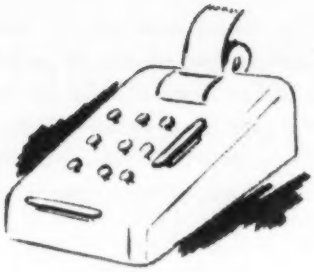
COMPLETE VETERINARY SERVICE PLUS MOBILE MIXING UNIT

Dr. G. G. Kroenke, Harrisonville, Missouri veterinarian, is attempting to meet the shifting agricultural picture in his community by providing a complete veterinary service. His well-equipped small animal facilities serve rural and city clients, while corral and chute space behind the hospital enhance large animal service.

In recent years, the major feed suppliers of this area shifted their service completely to bulk delivery and storage. When Dr. Kroenke noted that some clients were not ready to utilize bulk feed service, he arranged for a portable grinding and mixing unit to operate from his facility. Operating overhead is shared and a vital service has been made available.

It is interesting to note that Dr. Kroenke continues to render professional service to local feed representatives and maintains a good working relationship with this industry. No drugs are being mixed by the portable unit due to the importance of uniform mixing and control standards.





NEW FEE POLL

Here are four hypothetical cases. Estimate your fee on the line provided. Fill in the name of your state and mail to VETERINARY MEDICINE, 606 Livestock Exchange Building, Kansas City 2, Mo. If you do not want to tear out this page, simply send the case numbers with your state to November Fee Poll, c/o VETERINARY MEDICINE. Results of this fee poll will appear in a future issue.

What Would Be Your Fee For:

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Case 2: You set a fresh fracture of the radius and ulna on a dog using a padded aluminum splint. Your fee .....

Case 3: A heifer 10 miles from your office is having difficulty in calving. It is a posterior presentation with both legs retained. After 35 minutes work you deliver a live calf. Your fee .....

Case 4: You perform a cesarean section on a grade cow with a uterine torsion. A live calf is delivered. One return trip is necessary. The farm is 12 miles from your office. Your fee .....

Your state: .....

Why Shouldn't You Charge A Fair Professional Fee?

Harold Ashe
Beaumont, California

These are both frightening and wonderful new times in which we live. Unfortunately some of us have not quite caught up with our rapidly changing environment. A goodly number of older veterinarians seem to have this difficulty in adapting. They see affluence all around them, yet their reactions are those of the depression 30's, modified only slightly if at all. Many of these veterinarians have almost as rough a time of it now as then.

Back in the 30's, a veterinarian apologetically charged a dollar or two for a minor service and often as not was called a high-binder by his ungrateful clients. Now, with equal timidity, he charges $4 or $5 and still has a depressed professional wage for himself. He is still called a "robber" and he is likely to be as apologetic for his very act of existence as a two-time loser on probation.

His volume has probably doubled or tripled since the 30's. In terms of real dollars (purchasing power) he is probably not much better off now than then. He is not getting any younger. In the 30's, he consoled himself that times were bad and he was lucky just to keep even; never mind a savings program. Now, times were never better and he is still keeping even (well almost, if Uncle Sam would ease off on the income tax burden). Now he can no longer congratulate himself on his good luck. He has no worth mentioning outside the family circle and here it is met with impressive silence.

The Trouble: This typical *fee-conscious* veterinarian never got over being *fee-conscious.* It has become an occupational disease. Back in the 30's, a good many clients genuinely had a gripe. It was not that the veterinarian's fees were too high, the clients

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Veterinary Calendar

Nov. 15-16. **Midwest Small Animal Hospital Association** and Regional 3 meeting of American Animal Hospital Association. Hotel Burlington, Burlington, Iowa. J. Porter Cable, 2228 S. MacArthur Blvd., Springfield, Ill., secretary.

Dec. 3-5. **American Association of Equine Practitioners,** 8th annual meeting, Hotel Texas, Fort Worth, Texas. For further information, contact the Association, 531 Guaranty Bank Bldg., Denver 2, Colorado.

Dec. 4-5. **Kentucky Veterinary Medical Association** meeting, Kentucky Hotel, Louisville, Ky. L. S. Shirrell, 545 E. Main St., Frankfort, secretary-treasurer.

Jan. 16-17. **School of Veterinary Medicine of University of Pennsylvania,** 62nd annual conference of veterinarians. Robert Schwartzman, University of Pennsylvania, Philadelphia 4, chairman.

Jan. 17-19. **39th Annual Postgraduate Conference for Veterinarians,** College of Veterinary Medicine, Michigan State University, East Lansing, Mich. W. W. Armistead, Dean.

Jan. 21-23. **Oklahoma Veterinary Medical Association,** annual meeting, Mayo Hotel, Tulsa. W. D. Speer, 538 S. Madison, Tulsa, secretary.

Jan. 22-24. **Minnesota Veterinary Medical Association,** annual meeting, Hotel St. Paul, St. Paul, Minn. B. S. Pomeroy, 1443 Raymond Ave., St. Paul, secretary-treasurer.

Jan. 24-25. **North Carolina Veterinary Conference,** 24th annual meeting, North Carolina State College, Raleigh. Edward G. Batte, North Carolina State College, chairman.

Jan. 29-31. **Kansas Veterinary Medical Association,** 58th annual convention, Broadview Hotel, Wichita. M. W. Osburn, 1525 Humboldt, Manhattan, Ks., executive secretary.

Feb. 12-13. **Nevada State Veterinary Association,** annual winter meeting, Holiday Hotel, Reno. Brian L. Hutcherson, 300 Kietzke Lane, Reno, secretary.

Feb. 18-20. **Arkansas Veterinary Medical Association,** 45th annual meeting, Hotel Marion, Little Rock. T. D. Hendrickson, 7824 Cantrell Road, Little Rock, secretary-treasurer.

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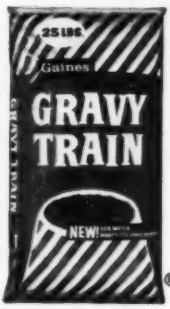

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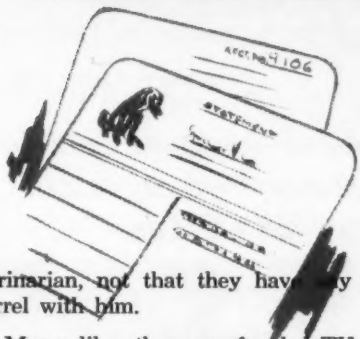
simply had too little money. They took their troubles out on the veterinarian, who had more than enough of his own. Now, these same clients, or reasonable facsimiles of those in the 30's, often roll in the green stuff. They continue to complain from habit and they still have too little money, even in the $20,000-a-year brackets. The veterinarian, admittedly *poor* because he is price-conscious, continues to twitch, apologize and explain.

What are the facts of life in the early 1960's? How fares the typical client of a price-conscious veterinarian? He (or she) looks something like this, give or take a little over-buying on easy terms. He and his spouse never had it so good! He pays last year's bills out of this year's income; but he is able to commit most of next year's earnings by making purchases this year. He drives a 1960 car not yet paid for and which he cannot afford. He already thinks about a new car with enough horsepower to run a small factory. His wife is unhappy with her postwar kitchen range. It will not be long until she persuades her husband that built-in cooking facilities and the new 60-month FHA Title I terms are manageable. Every year papa-and-mama spend two weeks at an expensive resort they cannot afford in 12 easy payments and 24% carrying charges. They patronize the best restaurants several times a month on a credit card. Frequent week-end trips are possible because of the thoughtfulness of those nice oil company people who let you charge almost everything including wish-you-were-here postcards and a night's lodging.

As a cartoonist so aptly put it, these people are the ones who "buy things they don't need with money they don't have to impress people they don't like." No one twists their arms. Then when the need for professional services arises, the roar that is heard when the bill is presented is not MGM's tired old lion complaining at TV re-runs. It is not that they do not make good money or have plenty of purchasing power, it is just that they have the purchasing power but not the immediate price for a fee that may be as little as $10 or $20. They have to let off a head of steam at the



veterinarian, not that they have any real quarrel with him.

Mama likes those newfangled TV dinners. The kind prepared by $3-an-hour factory kitchen help and that come to a buck a plate. This does not fatten papa's take-home pay but it is ever so much more convenient than cooking the hard way. So both papa and mama complain about the professional fees they pay their dentist, physician, psychiatrist, optometrist, attorney, tax consultant—and veterinarian.

Meanwhile our twitching veterinarian, still bemused by the depression, eats a boiled dinner long on starches and short on protein. He wonders why he is so bushed he cannot give even casual thought to the sad state of his practice. The little woman cooks on a prewar range of uncertain vintage. He debates how he can afford a cheap imported bike for junior for Christmas. If he is lucky he will have a long week-end vacation at a nearby cheap resort next summer. His old car just will not climb the hills to a more distant vacation area dear to his heart.

We would like to end this with a hopeful note, but since we have some personal acquaintance with the *price-conscious* veterinarian, a happy ending seems unlikely except for one possibility. That is that such veterinarians resolve to write their own ending, with they and their families living happily ever after, or at least comfortably and securely henceforth. There is just an outside chance that if *fee-conscious* veterinarians would quit thinking about how *low* to keep their professional charges and stop apologizing for demanding a fair professional reward for their skills, they might start living a little higher on the hog and do better by their families. Some clients at least might develop more respect for them.

VETERINARIANS IN THE NEWS

(continued from page 31a)

Colonel Jennings Cited for Distinguished Service in Veterinary Corps

Colonel William E. Jennings, Veterinary Corps, U. S. Army, was awarded recently two military awards—the Army Commendation Medal and the Certificate of Achievement—for his distinguished service.

The citations for the award of the Medal from Secretary of the Army Elvis J. Stahr, Jr. and the Certificate from General George H. Decker, Chief of Staff, U. S. Army appropriately described Colonel Jennings' work and commended him for his numerous professional attainments and inspirational leadership.

Colonel Jennings retires from the military service on September 30, 1961, upon completion of 27 years as a member of the Veterinary Corps, U. S. Army.

Dr. Swenson Conducts Research on Tranquilizers

Rats and chickens are consuming tranquilizers in a heart study at Iowa State University. Dr. Melvin J. Swenson, head of the department of veterinary physiology and pharmacology, is experimenting to determine the effects of tranquilizers on blood cholesterol levels and blood vessels in aged animals. His research is supported by the Iowa Heart Association.

Members of the Advisory Board confer at the annual conference of the Morris Animal Foundation in Boulder, Colo., June 27-29, left to right, Dr. Clarence R. Cole, The Ohio State University, Dr. W. J. Zontine, Lancaster, Calif., Dr. Joseph B. Engle of Summit, New Jersey, Dr. William D. Carlson of Colorado State University and Dr. Jack O. Knowles, Miami, Fla.

Anthelmintic Activity of Bephenium Hydroxynaphthoate Against Common Gastrointestinal Parasites of Cattle

Robert Rubin, D.V.M., M.S.
A. M. Eisa, B.V. Sc., M.S.
Fort Collins, Colorado

Limited data already reported[1,2,3] indicates bephenium hydroxynaphthoate (Franten, Burroughs Wellcome & Co. [U.S.A.], Tuckahoe, N. Y.) has both a broad spectrum of activity and a high degree of efficacy against some of the roundworms in the gastrointestinal tract of cattle. This report concerns a critical evaluation of the drug in 6 of 12 naturally parasitized yearling Hereford calves. In addition, the effect of a 36-hour fast prior to treatment is evaluated in 3 of the 6 medicated animals.

Twelve naturally parasitized yearling Hereford calves were purchased for the study. Their common origin suggested they might be harboring similar species of parasites. The 12 calves were divided into 6 pairs on the basis of egg counts. With the average eggs-per-gram of feces obtained from 4 successive daily examinations used as a basis, calves with the 2 highest average counts were paired, then calves with the next 2 highest, and so forth, until 6 pairs were selected. In addition, a random division was made, resulting in 2 groups composed of 3 pairs each. This pairing and subsequent random selection resulted in 3 calves to be treated without prior fasting and 3 calves to be treated following a 36-hour fasting period. Each of these 6 calves was paired with an untreated control calf.

Each calf to be treated was weighed within 24 hours before treatment, and a single oral dose of 225 mg. of bephenium hydroxynaphthoate per kg. of body weight (equivalent to 250 mg. of Franten per kg. of body weight) was administered in gelatin capsules with a balling gun.

Fecal egg counts were made daily during the pre-treatment and post-treatment periods. Ninety-six hours following treatment, each treated calf was euthanized and examined; one day later its untreated mate was similarly handled. Parasitological examination of each calf was performed as previously reported,[3] and in addition, the abomasum of each animal was digested[4] to facilitate recovery of any parasites that might have been missed in the regular collection technic.

The efficacy of bephenium hydroxynaphthoate was calculated for each of the genera present in all 12 calves on a basis of the total number of worms remaining after treatment compared with the total

Burroughs Welcome & Company (U. S. A.), Tuckahoe, New York, afforded the financial support for the research herein reported.

number recovered from the controls.

Results

Reduced Fecal Egg Counts: An obvious reduction in numbers of eggs per gram of feces was observed beginning 24 hours after medication in each of the 3 calves treated without prior fasting. The over-all reductions were measured from the day of treatment until 96 hours later and were 98.5%, 96.7% and 96.9% (Table 1).

A reduction in numbers of eggs per gram of feces also was observed in those calves that were fasted for 36 hours before treatment. In one of the calves this occurred within 24 hours after medication; however, in the remaining two it was not observed until 48 hours after medication. The reductions, measured for the 96-hour period following treatment, were 94.4%, 99.4% and 100% (Table 1).

None of the untreated controls from each pair showed any significant change in numbers of eggs recovered during this same period.

Significant Reduction in Common Parasites: The worms recovered from the 12 calves were identified as *Trichostrongylus axei, Ostertagia ostertagi, Cooperia oncophora, Oesophagostomum radiatum, Haemonchus* sp., *Nematodirus* sp. and *Bunostomum phlebotomum.* Only the first 4 worms mentioned were consistently present and considered in evaluation of the drug. The numbers of worms from these 4 genera of parasites recovered from the 3 nonfasted treated calves, the 3 fasted treated calves and also from the unmedicated control for each are shown in Table 2.

The percentage of efficacy differed appreciably between the 2 groups only in regard to *Trichostrongylus axei.* For this species, the drug was 71.8% effective in the nonfasted group as compared with 88.1% in the fasted group. For the other genera of parasites the efficacy was comparable in both groups of calves.

For both the nonfasted, treated group and the fasted, treated group, the efficacy was statistically significant at the 0.01 level (chi-square goodness-of-fit test).

Results Similar to Earlier Study: The anthelmintic activity of bephenium hydroxynaphthoate observed in this experiment substantiates an earlier report by the writers.[1] The results presented in this paper are very similar to those of the earlier study for the genera and species of parasites that were common to both experiments. Results

TABLE 1
The Effect of Bephenium Hydroxynaphthoate Treatment on Egg Counts During a 96-Hour Post-Treatment Period

	Eggs Per Gram of Feces						
	Four-Day Average Pretreatment	Day of treatment	24 hours post-treatment	48 hours post-treatment	72 hours post-treatment	96 hours post-treatment (necropsied)	% + reduction
Nonfasted							
1434	437	561	13	2	16	8	98.5
1435 Control	398						
1437	200	276	15	1	3	9	96.7
1429 Control	162						
1433	123	166	85	51	3	5	96.9
1432 Control	158						
Fasted							
1440	305	435	656	30	80	24	94.4
1436 Control	318						
1441	113	379	287	5	1	2	99.4
1431 Control	122						
1438	44	75	0	0	0	0	100.0
1439 Control	109						

TABLE 2

Numbers of Parasites Recovered at Necropsy from the Nonfasted and Fasted Groups and their Controls

	T. axei	% Reduction	*O. ostertagi*	% Reduction	*C. onchophora*	% Reduction	*O. radiatum*	% Reduction
Nonfasted Group								
Treated	326		375		64		0	
Controls	1,157	71.8	4,893	92.3	5,893	98.9	352	100
Fasted Group								
Treated	291		227		228		0	
Controls	2,463	88.1	3,835	94.0	2,666	94.1	180	100

of this study showed these figures, followed by results of the earlier study in parentheses: *T. axei* 82.9% (85.0%); *O. ostertagi* (98.6%); and *O. radiatum* (100.0%).

Although the use of bephenium hydroxynaphthoate as an anthelmintic for sheep and lambs has been frequently reported in the literature, the only work with cattle, other than that reported by the writers, has indicated good to excellent anthelmintic efficacy against *Haemonchus* spp., *Cooperia* spp., *Oesophagostomum radiatum, Trichostrongylus* spp. and *Bunostomum phlebotomum.* These results were obtained with a dosage of 225 mg./kg. of body weight.[1]

Fasting Not Beneficial: The only obvious effect of withdrawing feed for 36 hours before anthelmintic treatment was a delay in the observed reduction in the number of eggs in the fecal material for an additional 24 hours in 2 of the 3 fasted animals. For these two, the reduction was first observed 48 hours after treatment. The egg reduction in the 2 groups was similar enough to suggest that no additional anthelmintic action is obtained when cattle are fasted for 36 hours before treatment.

No Toxicity: No evidence of toxicity was observed in any of the treated calves either during the post-treatment period or at postmortem examination.

Although this is unrelated to the anthelmintic study reported, it is interesting to note that the flotation technic used was not efficient enough to detect eggs in the feces of calf No. 1438 after treatment. Thus, on the basis of egg count alone, the treatment was evaluated as 100% effective. At necropsy, 57 *T. axei* and 114 *O. ostertagi* were recovered. The flotation method used was a sodium chloride (sp. gr. 1.20) technic employed merely as an indication of drug activity and not as an exact criterion for determination of efficacy.

Summary

Anthelmintic efficacy of bephenium hydroxynaphthoate was tested against certain gastrointestinal roundworms by comparing the worms recovered at necropsy from 6 treated yearling Hereford calves with those recovered from 6 untreated controls. Treatment was given orally at the rate of 225 mg./kg. of body weight and showed the following efficacies: *Trichostrongylus axei,* 82.9%; *Ostertagia ostertagi,* 92.5%; *Cooperia onchophora,* 95.8% and *Oesophagostomum radiatum,* 100.0%. No beneficial effect was derived from fasting 3 of the 6 treated calves for 36 hours prior to treatment and is therefore not recommended as a pretreatment procedure.

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Therapeutic Use of a Diuretic for Retained Placenta and Udder Edema in Dairy Cows

R. F. Vigue, D.V.M.
Springvale, Maine

A common therapeutic problem found among dairy cattle is the failure of the uterus to expel the placenta promptly following parturition. This often results in the retention of the placental membranes. There is variation between species and the etiology of primary retention is obscure.[1]

The removal of the placenta is the initial step in treatment. Since it is desirable to wait at least 48 hours after parturition,[2] a herdsman may wait 48 to 72 hours if the cow seems normal in other respects, has a good appetite and no temperature elevation.[3] When attempting placenta removal, the most common method is manual manipulation. However, bacterial infection, often resulting in impaired breeding ability, is a serious threat of retained placenta.[3]

One of the approaches to management of retained placenta in dairy cows is the use of antibiotics.[3,4] Another possible treatment is the use of sodium acetazolamide (Vetamox, American Cyanamid).[5] The object of treatment is to enable the affected animal to be bred in the shortest possible time and to prevent unfavorable complications.

Another problem commonly observed in high-producing dairy cattle before and after parturition is physiological edema and congestion of the udder. Various therapeutic measures for reducing edema employed in the past have included massage, use of hot compresses, udder ointments and liniment, but all have been lacking in effectiveness.[1] On the other hand, the use of Vetamox has proved successful in control of udder edema.[5]

This report presents the clinical results of medication for udder edema and retained placenta in which Vetamox was administered as an oral preparation of 2 gm. *b.i.d.* per cow. The efficacy of Vetamox is supported by the short recovery time of the cattle receiving therapy and the significant difference from control results ($P<0.001$).

Clinical Study

In this study a total of 55 cows with retained placenta and udder edema were selected at random from different herds and breeds. For routine purposes, the placenta was considered as retained when it had not been expelled up to 24 hours postpartum and when the author was unable to remove the membranes manually. Even though different herds were used, all cases were treated with either a placebo, Vetamox, or Vetamox plus a penicillin-dihydrostreptomycin combination, between 24 and 72 hours postpartum. Where Vetamox was administered,

it was given in soluble powder form, at an oral dose of 2 gm. *b.i.d.* to each cow until the day of expulsion of the placenta or elimination of udder edema. Ten ml. per cow of the antibiotic combination was administered intramuscularly at the initiation of treatment only.

Retained Placenta: Of 29 cows with retained placenta, 12 were treated orally with 2 gm. of Vetamox *b.i.d.* per cow and 6 animals received an identical dose of Vetamox plus a 10 ml. intramuscular dose of penicillin-dihydrostreptomycin (administered at initiation of treatment only). The remaining 11 cows received a placebo. Table 1 summarizes the day of release of the placenta following initiation of treatment. The indicated treatments were initiated at the same time for all cows.

Although placental retention varied within the group, treatment was initiated 1 to 3 days following calving. The 6 animals receiving Vetamox plus penicillin-dihydrostreptomycin recovered in an average of 1.8 days. The remaining 12 cows receiving treatment with Vetamox alone had an average recovery time of 4.8 days. The controls recovered in an average of 9.5 days. The Vetamox results differ very significantly from the control results ($P<0.001$) and the Vetamox plus penicillin-dihydrostreptomycin results differ very significantly from the Vetamox results ($P<0.001$). These data are summarized in Table 1.

TABLE 1

Effect of Vetamox on Retained Placenta

Treatment Begun 24 to 72 Hours Following Calving

Day Placenta Released	Number of Cows Recovered		
	Control	Vetamox	Vetamox Plus pen.-strep.
1	—	—	1
2	—	—	5
3	—	2	—
4	—	3	—
5	—	4	—
6	—	2	—
7	—	—	—
8	3	1	—
9	3	—	—
10	3	—	—
11	1	—	—
12	1	—	—
Average No. of Days	9.5	4.8	1.8

Photograph courtesy of the American Cyanamid Co.

Udder Edema: Of the 26 cows in the series with udder edema, all were severely affected, with an average grade of 3.2, 4.0 being the most severe (Table 2). All the animals received treatment in the form of Vetamox or a placebo. Twelve cows served as controls and 14 cows received Vetamox.

It will be noted in Table 2 that there is no reason to suspect a breed or age difference. It is known that certain hereditary factors and feeding affect the incidence and severity of edema and since 2 separate farms were involved, these factors account for the difference between the breeds.

Fourteen of the 26 dairy cows with udder edema were treated with 2 gm. of Vetamox *b.i.d.* per cow. The average duration of udder edema in the treated group was 10.0 days, while the control group of 12 animals receiving a placebo had an average recovery time of 19.2 days. The difference between the 2 mean recovery times is highly significant ($P<0.001$).

Conclusions

An oral preparation of 2 gm. of Vetamox was administered twice daily for the

TABLE 2
Efficacy of Vetamox in Udder Edema

Treatment	No. of Cows	Breed	Age (Average)	Edema Grade*	Recovery (Avg. No. Days)
Control	7	Guernsey	3.0	3.0	21.0
	5	Ayrshire	3.6	3.4	17.4
	12 (total)		3.3 (Avg.)	3.2 (Avg.)	19.2 (Avg.)
Vetamox	8	Guernsey	4.0	3.0	9.2
	6	Ayrshire	4.0	3.3	10.8
	14 (total)		4.0 (Avg.)	3.2 (Avg.)	10.0 (Avg.)

* = Scale of 1.0 to 4.0 used, with 4.0 being most severe.

control of physiological udder edema in dairy cows. Additional treatment groups of Vetamox or Vetamox plus an intramuscular dose of pencillin-dihydrostreptomycin for the control of retained placenta were included in this study.

In the group of 29 animals with retained placenta, 6 cows receiving Vetamox plus pencillin-dihydrostreptomycin, 12 cows receiving Vetamox alone and 11 cows receiving a placebo averaged 1.8, 4.8 and 9.5 days respectively to recover. Under conditions reported in the group of 26 dairy cows with udder edema, average recovery time of 14 treated animals was 10.0 days as compared to the control group which averaged 19.2 days to recover.

The results obtained indicate an oral preparation of 2 gm. of Vetamox (acetazolamide sodium) *b.i.d.* per cow proved to be effective in treatment of retained placenta and physiological udder edema.

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Hot Weather Interrupts Cows' Estrus Cycle

A cow's estrus cycle may be interrupted by prolonged hot weather. Studies by ARS animal husbandrymen have proved that high temperature without an accompanying decrease in the animal's feed intake can stop a cow's heat period. This study also illustrated the ability of the animals to adapt by shedding their hair.

The estrus cycles stopped in 5 of 6 heifers subjected to a continuous temperature of 90 F. for 7 months. The heifers' ovaries remained partially active; follicles formed but did not mature and rupture.

All heifers adjusted to the artificial environment. Their heat periods were reestablished by the 5th month and they were bred. Five conceived and remained pregnant in the artificial environment.

The heat cycle interruptions occurred when rectal temperatures, water consumption and respiration rates were the highest. These body functions began to drop as the animals began to shed hair and after 4 months were normal. At this time their hair coats were very thin and slick.

These researchers found that animals in poor condition do not shed as much hair nor as quickly as thriftier cattle. They suggest clipping the winter coat in the spring to aid cattle in their adjustment to the onset of hot weather.

Veterinary Radiology by William D. Carlson, illustrated, 474 pages. Lea and Febiger, 600 South Washington Square, Philadelphia 6, Pa. Price—$18.50.

This book is designed primarily for the practicing veterinarian. The purpose is to demonstrate the full potentiality of veterinary radiology. The scope of nearly all of this book can be accomplished with facilities and equipment available in the average small or large animal hospital.

It is divided into 3 parts. Part I is concerned with radiographic principles. This incorporates radiographic interpretation, the *x*-ray machine along with principles of its operation, of obtaining good radiographs, radiographic positioning, and normal radiographic anatomy of large and small animals. Chapter 6 deals with special radiographic technics such as enemas and cystography. Equally important are the chapters devoted to the darkroom and processing of radiographs. The latter includes an illustrated discussion of possible technical errors in processing radiographs and how to prevent them. The author lists equipment he believes is necessary to start a conservative radiographic operation in a hospital or clinic.

The second and largest part of the book is an atlas of radiographic pathology. It is divided into large and small animal sections with radiographic illustrations by regions of the body.

Part III is a small portion that deals with radiation therapy. There are suggested procedures and dosage schedules as well as illustrations. A few pages briefly discuss nuclear medicine.

Phenothiazine: An Annotated Bibliography through 1958 by Dr. Dean S. Folse, Kansas State University, in cooperation with The National Institutes of Health. No price given.

This publication covers all the references on this subject through 1958. The references are listed alphabetically by year.

Physiology of Reproduction and Artificial Insemination of Cattle by Glenn W. Salisbury and Noland L. VanDemark, 639 pages, illustrated. W. H. Freeman and Company, 660 Market St., San Francisco, California.

This book brings together much of the pertinent literature on reproduction in cattle. It was designed for veterinarians, artificial insemination technicians and those working in fields related to bovine reproduction. It deals primarily with the physiology of reproduction and artificial insemination. A few short chapters briefly discuss the pathological and physiological causes of reproductive failure but present very little on clinical treatment.

Reproductive anatomy and physiology are discussed in considerable detail. For the female, this is all the way through parturition and involution of the uterus. In the male, the production as well as the detailed chemistry and physiology of semen are discussed as these factors relate to artificial insemination. The technics of preserving semen and insemination are described. Factors of conception and measurement of reproductive efficiency in cows and bulls are discussed. The final sections of the book deal with management factors affecting reproduction in the cow and bull.

This is an excellent book for those interested in reproductive problems of the bovine, though much is of too technical a nature for a practicing veterinarian.

MEDICAL INTERCHANGE

Notes and abstracts screened from the medical literature for their special interest to veterinarians by Lynn Stratton Morris.

Mechanical Cardiac Pulsator

Ready for trial in man is a machine designed to replace the surgeon's hand in cardiac massage. Intended for operating room emergencies, the mechano-cardiac pulsator utilizes a pump sending compressed air to a latex cuff fitted around the heart.

The machine, which was demonstrated at the annual meeting of the American College of Chest Physicians in New York, avoids the problem of fatigue in manual massage and can be set to produce a desired rate of heart beat.

In laboratory trials it enabled survival of 19 of 21 animals. The other 2 succumbed to other causes, reported Drs. Philip Y. Atalla, Cesar B. Vial, Peter V. Moulder and William E. Adams of the University of Chicago.

G. P., 24:163, September, 1961

Antibacterial Substance Needed in Plastic Dressings

From a study of 3 plastic dressings for clinical use, Dr. Joseph M. Miller and associates of the Department of Surgery, School of Medicine, The Johns Hopkins University, Baltimore, conclude that an antimicrobial substance is a necessary additive to such dressings.

The dressings investigated included Aeroplast, Rezifilm and Scan spray-on dressing S-2. Studies of their respective antimicrobial action demonstrated that Aeroplast does not have an antimicrobial effect against any of the microorganisms tested, while Rezifilm and Scan spray-on dressing S-2 produced such action only on *Staphylococcus aureus, Streptococcus pyogenes* and *Candida albicans. Escherichia coli, Proteus vulgaris, Pseudomonas aeruginosa* and *Aerobacter aerogenes* were unaffected.

None of these 3 dressings produced a film impermeable to water and *Staphylococcus aureus* when the films were made on a wet surface. The situation was changed when a dry surface was used, for these films were impermeable to *Serratia marcescens* when tested *in vitro* and *in vivo.*

The investigators recommend that all areas should be sprayed at least twice to avoid bare spots. An impermeable film will be obtained only on a dry surface. The degree of impermeability apparently is directly related to the amount of water on the surface receiving the film. In slightly wet areas, the film will keep gross contamination from the selected area but bacteria will pass through the membrane. It is suggested that an antimicrobial substance be added to the dressing to kill the bacteria passing through a permeable film. If such a chemical is used, it should be able to diffuse easily from the film.

The study was undertaken because the related problems of antimicrobial action and permeability are important if the use of plastic dressings is intended to prevent bacteria from entering a clean wound.

Am. Jour. Surg., 102:115-17 July, 1961

Veterinary Research and Development Shows:

MASTALONE

the therapeutic answer to infectious mastitis offering broad-spectrum treatment in-depth

---

Introduction

Mastalone is a unique, balanced formulation of effective antibiotics and a potent anti-inflammatory corticosteroid developed for intramammary use. Its special combination of ingredients is effective in the treatment of almost all known types of bacterial infectious bovine mastitis. Each 10 cc. of Mastalone contains the following active ingredients in a suitable base:

Oxytetracycline as the hydrochloride	200 mg.
Oleandomycin base	100 mg.
Neomycin as the sulfate	100 mg.
Prednisolone	5 mg.

Oxytetracycline HCl:

A broad-spectrum antibiotic effective against many gram-positive and gram-negative bacteria (both aerobic and anaerobic), spirochetes, rickettsiae, and certain large viruses.

Oleandomycin:

An antibiotic particularly effective against gram-positive organisms – including many penicillin-resistant staphylococci and streptococci.

Neomycin:

Similar to streptomycin in chemical and pharmacological properties, but demonstrating a wider spectrum of antibacterial activity, including many streptomycin-resistant organisms and problem bacteria of the Proteus and Pseudomonas groups.

Prednisolone:

A highly potent anti-inflammatory agent three to four times as potent as hydrocortisone but with significantly

reduced tendencies to produce untoward side effects such as fluid and sodium retention, potassium depletion, and other hormonal and metabolic disturbances associated with earlier corticosteroids. By reducing inflammatory changes such as swelling and edema, prednisolone may facilitate the introduction of antibiotic activity to previously inaccessible areas of the diseased udder.

Indications

Mastalone is indicated in the treatment of acute and chronic mastitis caused by or associated with organisms susceptible to the antibiotic activity of oxytetracycline, neomycin, and oleandomycin. Mastalone's unique formulation of antimicrobial and anti-inflammatory agents offers in a convenient dosage form, a product that is effective against almost all known types of bacterial infectious bovine mastitis. The major objective in the treatment of infectious bovine mastitis is to effectively eliminate the active infection as rapidly and as economically as possible while preventing permanent damage to the mammary tissues. Mastalone has been developed to meet this objective.

Dosage

The entire contents of one tube of Mastalone (10 cc.) should be infused into each infected quarter immediately after milking. To reduce recurrence of the disease, treatment should be continued for 48 hours after symptoms have disappeared. Where systemic involvement is evident, parenteral antibiotics (such as an injectable form of oxytetracycline) and supportive therapy are recommended in addition to the local (intramammary) infusion with Mastalone.

Field Reports

Field reports indicate that one of the greatest problems in treating acute and subacute clinical mastitis is the resistance of certain bacteria, especially staphylococci, to penicillin and various chemotherapeutic agents. Because of this situation, treatment results are often inconsistent.

One major advantage of Mastalone lies in its broader scope of activity against those strains of bacteria which may have built up resistance to the effect of penicillin and dihydrostreptomycin or those bacteria against which these antibiotics may never have been effective. Mastalone has been found to be effective in the treatment of acute and subacute clinical mastitis, and most important, it's been shown to give *consistent results* in a great number of reported cases.

No Penicillin Residues

Research data indicate that Mastalone milks out of the udder within 72 hours . . . and there's no problem of penicillin residues or penicillin resistance.

Warning

Milk taken from dairy animals within 72 hours after the last treatment for mastitis must not be used for food.

Mastalone Clinical Summary

In a series of 287 cases treated with Mastalone, clinical investigators, veterinarians in Wisconsin, Illinois, Indiana and New York reported to the Department of Veterinary Medicine that Mastalone produced favorable results in most cases, with no undesirable side effects. Most reported Mastalone convenient to use, free-flowing—even in cold weather. Some of these cases are summarized below.

MASTALONE CLINICAL SUMMARY

Diagnosis	No. Animals Treated	Treatment	Investigator's Results and Remarks	Investigator
Acute and chronic clinical mastitis; laboratory confirmed.	20	10 cc. Mastalone; repeated in 24 hours.	Favorable results noticed in 36 to 48 hours in early cases; some improvement noticed even in chronic cases. No undesirable effects.	Illinois C-13-221
Acute, subacute, and chronic clinical mastitis.	12	10 cc. Mastalone.	Recovery of acute cases in 48-72 hours; recovery of subacute cases in 24-48 hours. No dramatic improvements in chronic cases. No undesirable side effects.	Illinois C-13-228
Acute clinical mastitis.	35	10 cc. Mastalone; in some cases repeated in 24 to 36 hours.	Recovery, as indicated by reduced inflammation and improvement in color and consistency of milk, observed in 24 to 36 hours. Results consistently good; no undesirable side effects. Mastalone is free flowing and was convenient to use, even in cold weather.	Illinois C-13-226
Chronic clinical mastitis.	8	10 cc. Mastalone; in some cases repeated in 24 hours.	Five cases made satisfactory recovery; 3 cases incurable with any treatment.	Illinois C-13-233
Acute and chronic clinical mastitis.	6	10 cc. Mastalone every 12 hours.	Improvement noted in 24 hours in 5 cases; full recovery in 72 hours. No response in 1 case of chronic mastitis.	Illinois C-13-235
Clinical mastitis.	25	10 cc. Mastalone; repeated in 24 hours in some cases.	Recovery in 24 to 48 hours. Results were better than other therapeutic agents used; no undesirable side effects.	Illinois C-13-238
Streptococcal clinical mastitis; laboratory confirmed.	6	10 cc. Mastalone.	Improvement of condition was satisfactory 24 hours after treatment; further treatment was not considered necessary.	Illinois C-13-402
Acute and subacute clinical mastitis.	70	10 cc. Mastalone every 24 hours until recovered with maximum of 4 treatments.	Excellent response in 24 hours; recovery in 24 to 48 hours. Mastalone gives more consistent results and seems to be effective in more types of cases than other therapeutic mastitis agents.	Illinois C-13-239-A C-13-239-B C-13-239-C C-13-239-D
Infectious mastitis; laboratory confirmed.	8	10 cc. Mastalone, 3 treatments at 12 hour intervals.	Treatment satisfactory in 6 cases; repeated in 2 cases.	Illinois C-13-503
Clinical mastitis.	15	10 cc. Mastalone every 12 hours until recovered.	Results noted in 12 to 36 hours. Appears to be superior to other products, especially in severely swollen udders; also seems to have a broader range of effectiveness.	Indiana C-13-299
Clinical mastitis.	7	10 cc. Mastalone every 12 to 24 hours for one to three days.	Response good to excellent. Most cases cleared up in 2 days.	Indiana C-13-299-C
Subclinical staphylococcal mastitis; laboratory confirmed.	9	10 cc. Mastalone repeated in 48 hours.	Seven out of the 9 cases were negative for staphylococci on follow-up laboratory study after 2 treatments with Mastalone.	New York C-13-950

Packaging

Mastalone is available in 10-cc. metal tubes—12 tubes per carton, and 12 cartons per shipper. Quantity prices are available. Use this special order form when you order your supply.

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Many practitioners have been impressed with the clinical improvement of cattle after drenching with a newly patented purified phenothiazine formula. A particularly important achievement of the exclusive phenothiazine formula is its ability to disperse more phenothiazine into the abomasum and intestinal tract in a shorter period of time. Extensive and critical tests prove this action kills more internal parasites with relatively little of the formula being absorbed by the treated animals. Results indicate the patented formula made with purified phenothiazine, micronized for maximum efficiency does not interfere with normal digestive processes, there is no loss of appetite, and it is less toxic.

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Another important fact in substantiating the effectiveness of the anthelmintic is its property to control stomach and intestinal parasites without increasing the dose.

Many veterinarians are using this purified phenothiazine formula under the professional label Pro-Brand VT Cattle Drench, without lead arsenate, or Pro-Brand Improved Cattle Wormer with lead arsenate, which are sold only to veterinarians. For details on this and other quality Pro-Brand products write to Pro-Brand Products Company, 2021 No. Grove Street, Fort Worth, Texas.

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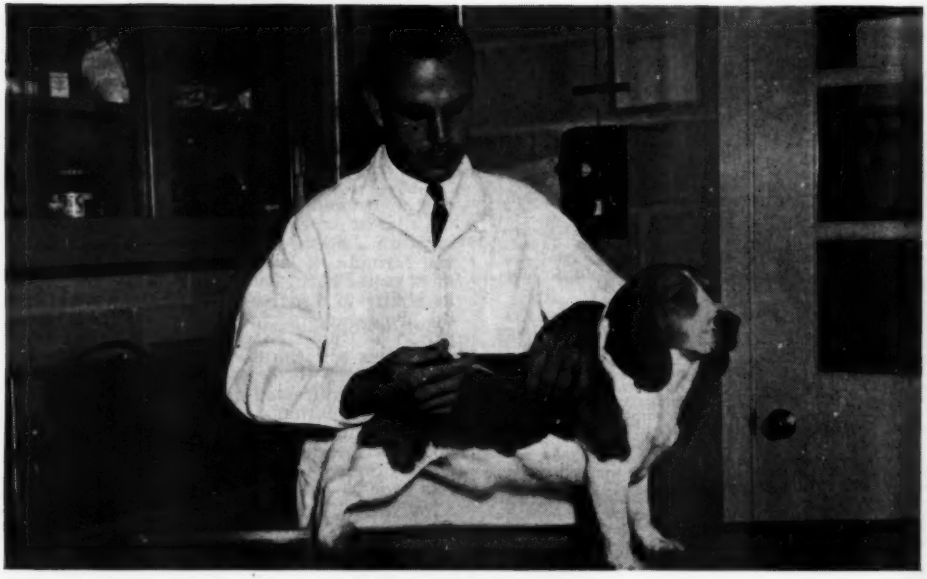
HOOKWORMS IN DOGS



LABORATORY TRIALS

DOGS INFECTED WITH ANCYLOSTOMA BRAZILIENSE

Dose D.N.P. milligrams per pound body weight	Eggs per gram feces Pretreatment	Post	Worms at Necropsy	Per cent Reduction
3.4	2100	0	0	100
3.4	3100	0	0	100
3.4	8200	0	0	100
3.4	2100	0	0	100
3.4	2300	0	4 dead	100
3.4	1800	0	8 dead	100
0	2900	–	41	0

DOGS INFECTED WITH UNCINARIA STENOCAPHALA

Dose D.N.P. milligrams per pound body weight	Eggs per gram feces Pretreatment	Post	Worms at Necropsy	Per cent Reduction
3.4	7	0	0	100
4.5	11	0	0	100
0	8	12	35	0

DOGS INFECTED WITH ANCYLOSTOMA CANINUM

Number dogs	Mg. D.N.P. per pound	Range Eggs per gram feces Pretreatment	Post	Worms at Necropsy	Per cent Reduction
2	1.1	44-46	10-13	21-41	9-55
10	2.3	29-29	0-1	0-12	84-100
9	3.4	29-73	0-2	0-1	97-100
2	4.5	33-35	0	0	100

D.N.P. Disophenol Parenteral 3.5% is available singly in 10-c.c. vials, or in 12-vial packages.

D.N.P.® Disophenol Parenteral 3.5% is a sterile solution containing 35 mg., Disophenol per c.c.

It is highly effective for the treatment of dogs infested with hookworms, including *Ancylostoma caninum, A. braziliense* and *Uncinara stenocephala.*

Treatment

Special pretreatment or posttreatment handling of patients is not required. D.N.P. has been shown to be safe at recommended dosage by clinical trials in dogs of all ages, including day-old puppies.

A single subcutaneous injection of D.N.P. usually results in a 100 per cent kill of adult hookworms. Dosage is 0.1 c.c. per pound of body weight. D.N.P. is primarily effective against adult hookworms.

Precautions

Do not repeat treatment within 14 days. A fecal examination should be made two to four weeks following initial treatment. Periodic fecal examinations should be made because of the possibility of re-infestation.

It is also desirable to use supportive therapy in puppies with severe anemia resulting from heavy hookworm infestation.

Field trials

Veterinarians have reported on the treatment of 671 dogs with D.N.P. These dogs weighed one-half to 112 pounds, ranged in age from 2 days to 13 years and included pregnant bitches. No reactions from D.N.P. were reported. Veterinarians reported that 88.2% of 671 dogs, treated with one subcutaneous dose of D.N.P., were free of hookworm eggs and 10% showed significant reduction of hookworm eggs on posttreatment fecal examination.

Laboratory trials

The results of four laboratory trials with D.N.P. are shown at the left. Veterinary Professional Service Department, American Cyanamid Company, Princeton, New Jersey.

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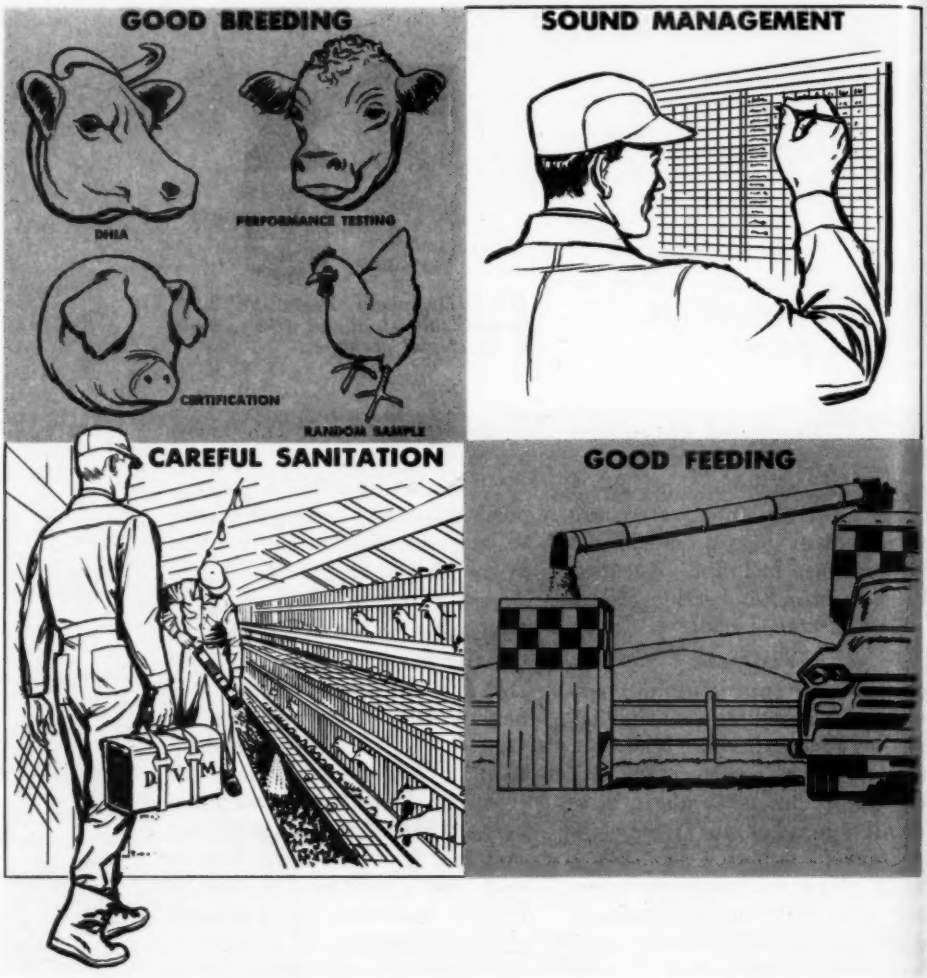

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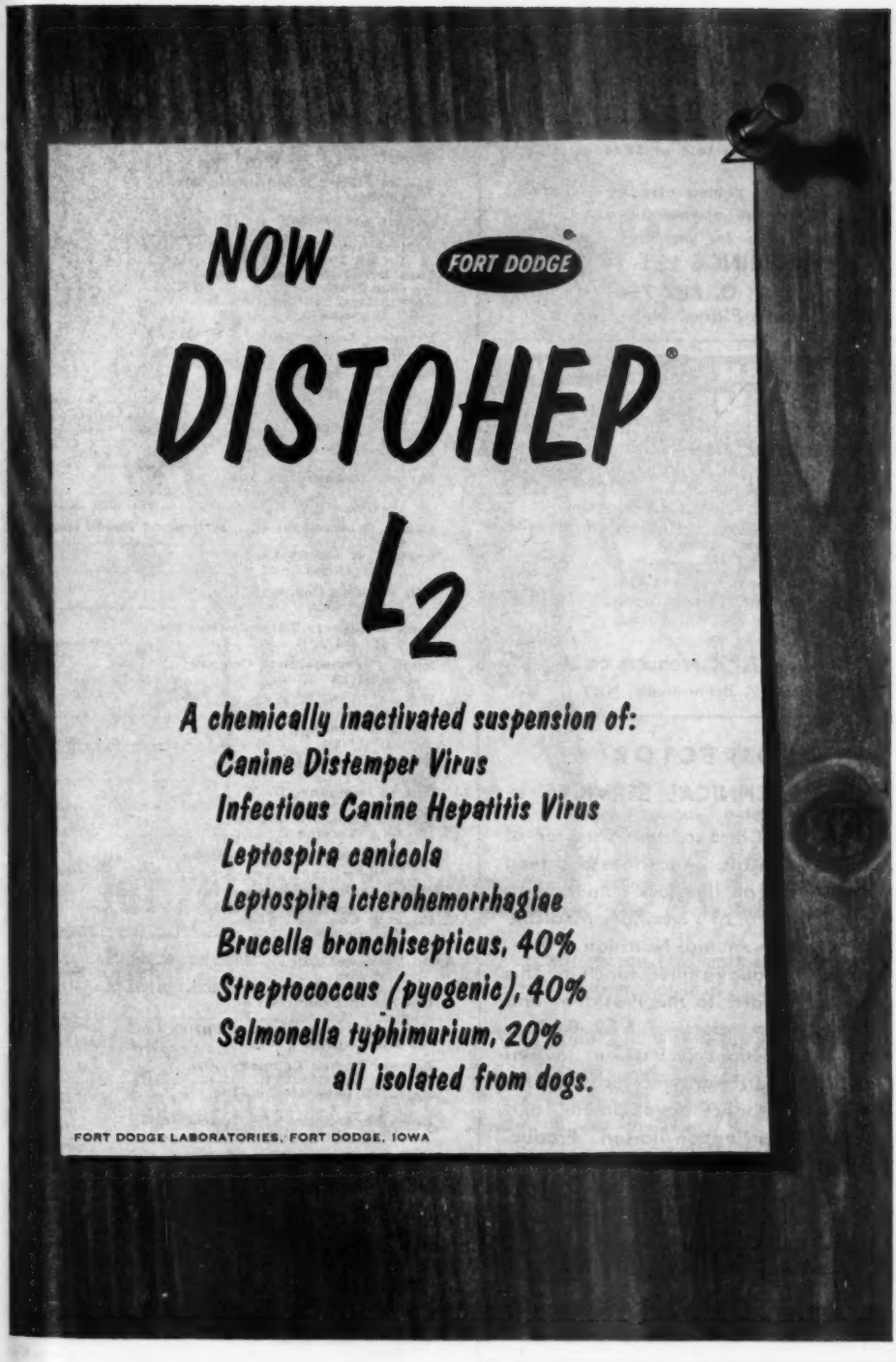
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Coccidioidomycosis in Cattle

Distribution of *Coccidioides immitis* in cattle 5 to 6 years old is about the same as that found in human beings with 12 years or more of exposure in an endemic area.

In an Arizona study, Keith T. Maddy, D.V.M., M.P.H.; H. Gilbert Crecelius, Ph.D., and Richard G. Cornell, Ph.D., compared data for persons and cattle living in the same areas. Cattle were found to become infected at about twice the rate for persons living in the same area. A previous study revealed the tendency for the prevalence of positive skin test reactions of persons to level off after 12 years of exposure. In cattle it was found that after 6 years of exposure there was also a marked leveling off.

The annual rate of conversions to positive among cattle is almost identical to that

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found in skin tests of persons in endemic counties during the first year of exposure. Therefore the rates for cattle are indicative of the actual percent of a susceptible human population that becomes infected per year for each county.

In the present study, fomites, such as feeds raised in endemic areas, did not appear to be good vehicles for transmission of *C. immitis* to cattle on these feeds in non-endemic areas.

The investigators believe this study shows how an animal with a limited home range and also acquiring an infection common to man, can be used to delineate the geographic distribution of an infective agent. For example, if a good blastomycin could be produced, perhaps a skin-test survey of home-raised cattle in selected areas of central and eastern United States would also reveal useful ecologic data on blastomycosis.

Reprinted from Public Health Reports 75, No. 10, October, 1960, Arizona Medicine, 18:52A-53A, June, 1961

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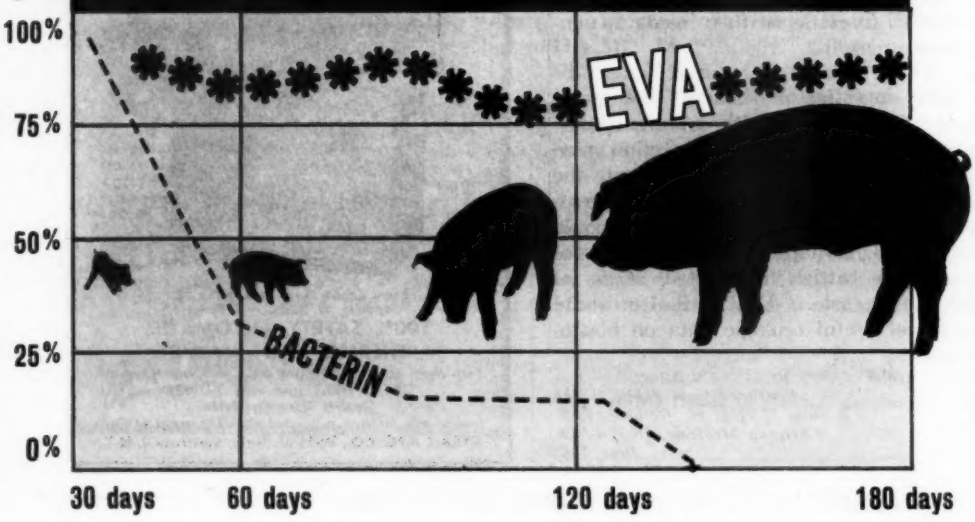

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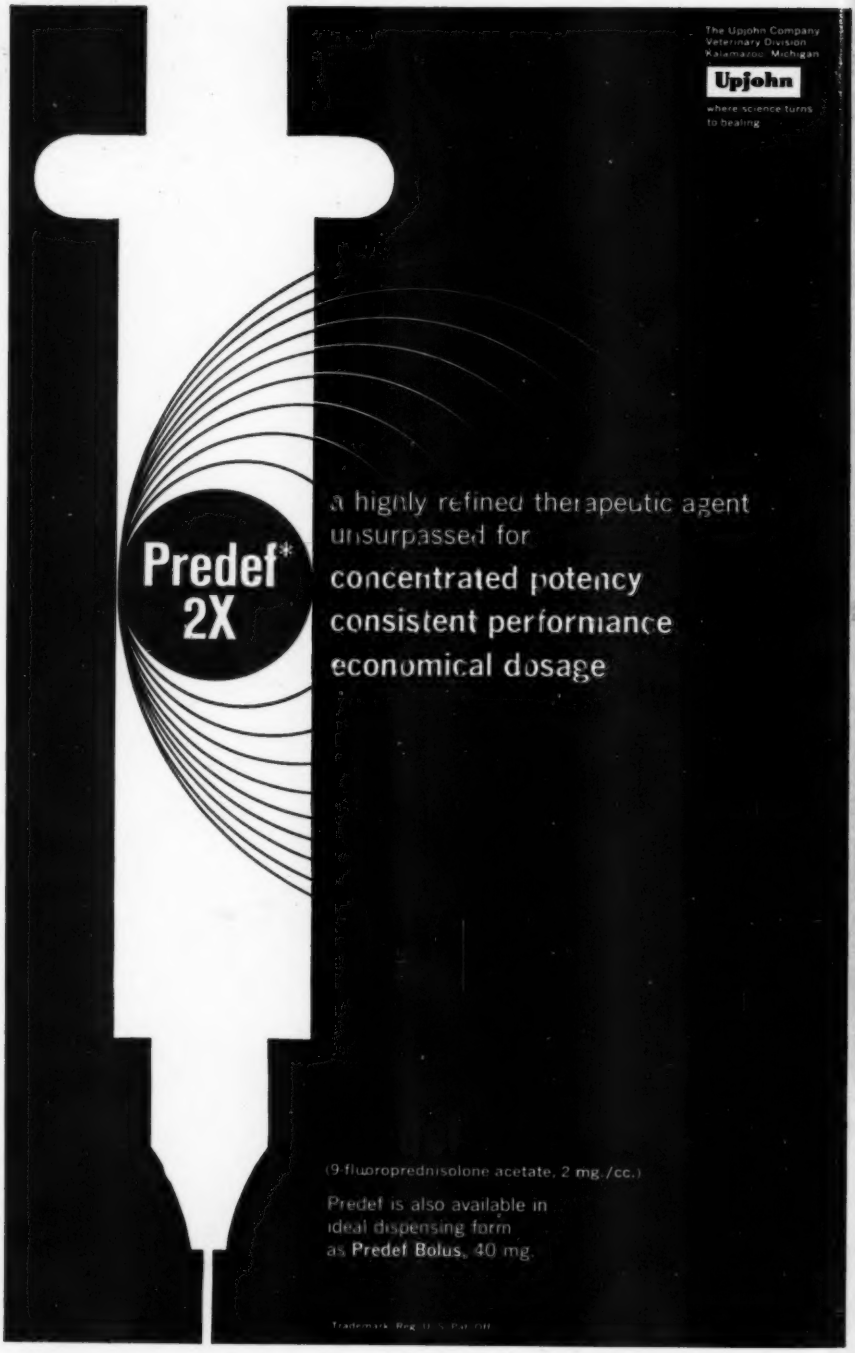
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